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MODIFICATION OF THE VACCINE RESPONSE IN RABBITS BY THE APPLICATION OF DIPHTHERIA TOXIN TO THE VACCINATION SITE

By CHAS. ARMSTRONG, *Surgeon, United States Public Health Service*

Various substances have been reported from time to time as exerting a local modifying influence upon the character of vaccination "takes" in animals. Ledingham (1927) reported that India ink exerted a deterrent local influence upon cutaneous and more especially upon intracutaneous vaccinations in rabbits when incorporated with the vaccine virus.

Carnot and his coworkers (1926), Le Fevre (1927), and Rivers and his associates (1928) showed that various forms of irradiation of the skin of rabbits would induce a local refractory state to a subsequently performed cutaneous vaccination. Seiffert (1931) reported that the local response engendered by the application of the appropriate antigen to the skin of sensitized animals will counteract the effect of a weakly virulent vaccine virus applied at the reacting site.

The writer has investigated the influence of various substances incorporated with vaccine virus upon the "take" in rabbits and has found that diphtheria toxin (guinea pig M. L. D. 0.0045 cc) when diluted 1:50 in saline and mixed with an equal volume of vaccine virus exerted a deterrent effect upon both the local and systemic vaccine response.

This effect was noted with various strains of vaccine, but was most apparent with virus highly potent for the rabbit. Consequently, most of our work has been done with the virulent strain of virus previously described (Armstrong, 1929).

The deterrent effect of diphtheria toxin was apparent following varied methods of vaccination but seemed to be most apparent when a superficial type of insertion and a relatively low dilution of toxin were used.

We have, therefore, usually employed an insertion one-half inch in diameter which was made by superficially pricking the dermis, through 0.1 cc of the virus-toxin mixture, by means of a sharp needle. For control purposes a similar procedure was employed except

that the virus was diluted with an equal volume of diphtheria toxin (1:50 in saline) which had been previously heated for 15 minutes at 98° C.

CHARACTER OF THE "TAKES"

In animals vaccinated with virus plus active diphtheria toxin the lesions at the end of 24 hours consisted of pink, slightly edematous areas, usually about 1 inch in diameter. At the end of two days the lesions were wider and brighter in color, and the central pricked areas were either mottled with purplish subepithelial hemorrhages or, when these were absent, they showed a yellowish cast through the injured epidermis. This central area was often surrounded by a zone of pale yellowish pink bordered on its outer edge by a narrower zone of bright pink which faded into normal skin. More or less maceration of the epidermis was usually present. By the end of 72 hours the lesions had usually begun to fade and shrink, the edema gradually disappeared, and a dry scab with scaling edges resulted. The lesions as described were similar to those produced by diphtheria toxin alone when applied by this method. Often no reaction suggestive of a vaccine "take" occurred. In some instances, however, vaccine lesions evinced by varying degrees of erythema and subcutaneous edema did develop, oftenest at the ventral border of the scab. A few secondary vaccine papules on the epilated areas outside the site of the "Schick" reaction were common. Upon recovery, the animals were immune to vaccinia.

In the group vaccinated with virus plus heated toxin, the lesions at the end of 24 hours were pale pink, slightly elevated spots approximately the size of the original insertion. The following day there was not much change, but by the third day the pink areas were beginning to enlarge and considerable subcutaneous edema was usually present, especially ventrally. The pricked areas at this time usually showed some superficial necrosis with a purplish discoloration. During the next 4 or 5 days the subcutaneous edema usually increased markedly and often became massive along the whole abdomen. The central purple, necrotic areas enlarged also and ultimately dried to thick black scabs. Secondary papules on the epilated areas were common. In order to rule out variations in the susceptibility of different rabbits to vaccinia, several tests were made by vaccinating the same rabbit with both the test and control mixtures. The results showed the same differences as those described.

TABLE 1.—(a) *The temperature response (°C) in rabbits vaccinated with vaccine plus raw diphtheria toxin*

Rabbit No.	Days after vaccination										
	0	1	2	3	4	5	6	7	8	9	10
1579	[illegible]-39.5	39.5-40.9	39.5-	39.9-	40.6-40.6	40.1-41.0	40.9-41.4	40.4-40.5	39.7-[illegible]	39.0	----------
1581	39.0-39.6	39.9-39.7	39.6-	40.0-	39.9-40.0	40.7-40.8	40.2-40.0	40.2-40.2	40.2-[illegible]	39.7	----------
[illegible]	39.3-39.4	39.4-39.6	39.[illegible]-	39.4-	39.7-40.0	39.9-40.0	39.8-40.0	39.6-39.9	39.3-39	39.3	----------
[illegible]	39.5-39.9	[illegible]	39.6-39.7	-40.1	40.4-[illegible]	41.0-41.2	41.[illegible]-41.1	41.0-41.[illegible]	41.0-41.0	40.5	39.5-39.5
[illegible]	39.6-[illegible]	[illegible]	39.5-39.6	-39.7	40.0-41.9	41.0-40.6	40.[illegible]-40.4	39.5-39.6	39.3-39.6	[illegible]	[illegible].7-39.4
[illegible]	39.5-[illegible].5	[illegible]	39.5-39.8	-40.6	39.6-41.[illegible]	40.7-40.5	40.3-40.5	40.[illegible]-40.0	40.[illegible]-40.5	[illegible]	39.6-39.3
[illegible]	39.2-39.[illegible]	[illegible]	39.8-39.7	-39.9	39.5-41.1	41.0-40.4	40.5-[illegible]	39.5-39.[illegible]	39.7-40.0	[illegible]	39.6-39.4
[illegible]	39.2-[illegible].5	[illegible]	39.8-39.8	-40.0	39.9-40.5	40.6-39.5	40.0-39.8	[illegible]	[illegible].4-[illegible].5	[illegible]	[illegible]-39.3
[illegible]	39.3-[illegible]	[illegible].4-[illegible]	39.8-40.1	-40.7	40.2-[illegible]	40.9-40.7	40.6-40.8	40.6-40.1	[illegible].5-[illegible].1	[illegible]	39.5-39.3
Average temperature	39.2-39.7	[illegible].5-39.7	39.7-39.8	39.5-40.1	40.6-[illegible].6	40.7-40.5	40.5-40.5	40.1-40.1	39.5-[illegible]	[illegible].5	39.6-39.4

(b) *Temperature response in rabbits vaccinated with vaccine plus heated diphtheria toxin*

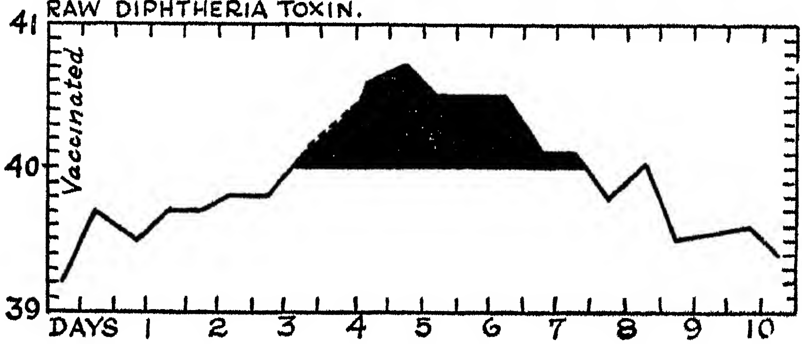
Rabbit No.	Days after vaccination										
	0	1	2	3	4	5	6	7	8	9	10
[illegible]	[illegible]	[illegible]	40.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	----------
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	----------
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	----------
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Average temperature	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

* [illegible] proved to be immune to vaccine; excluded from averages

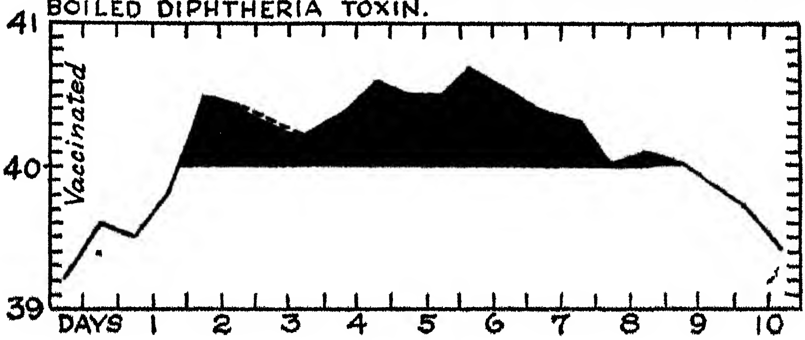
SYSTEMIC RESPONSE

Temperature.—Temperatures on experimental animals recorded twice daily are shown in Table 1. It will be noted that the temperatures in the virus-toxin group of nine animals tended to reach 40° C from one to three days later and to return to normal earlier than was the case in the animals of the control group. The curves of average temperatures for the two groups are shown in the accompanying Chart.

CURVE OF AVERAGE TEMPERATURE FOR NINE RABBITS VACCINATED WITH VACCINE VIRUS PLUS 1:50 DILUTION OF RAW DIPHTHERIA TOXIN.



CURVE OF AVERAGE TEMPERATURE FOR NINE RABBITS VACCINATED WITH VACCINE VIRUS PLUS 1:50 DILUTION OF BOILED DIPHTHERIA TOXIN.



Outcome.—Judged from general appearances, the animals vaccinated with the virus-toxin mixtures tended to withstand the resulting vaccinia better than did the controls. In order to test further this impression, a group of rabbits was vaccinated by a method which with virus 28628–88 would ordinarily cause some fatalities. Four rabbits were each vaccinated, in four areas one-half inch in diameter, with virus to which an equal volume of diphtheria toxin (1/50 dil.) had been added. Four control rabbits were similarly vaccinated, except that the toxin was previously heated for 15 minutes at 98° C. The

animals of the test group were all severely affected, but recovered, while three of the four control animals died (see Table 2). The autopsy findings were consistent with vaccinia in two of these, while in the third there was an accompanying consolidation involving parts of both lungs.

TABLE 2.—*The effect of adding diphtheria toxin to vaccine virus upon the mortality of intensively vaccinated rabbits*

VACCINATED VIRUS+TOXIN ON NOVEMBER 11, 1931 (4 AREAS)

Rabbit No.	Results: Local	Results: General	Outcome
1588	Modified	Moderate	Recovered
1590	do	Severe	Do.
1592	do	do	Do.
1594	do	do	Do.

VACCINATED VIRUS+HEATED TOXIN ON NOVEMBER 11, 1931 (4 AREAS)

Rabbit No.	Results: Local	Results: General	Outcome
1589	Very severe		Dead Nov. 18, 1931, of vaccinia
1591	Severe		Do
1593	Moderate	Severe	Recovered.
1595	Slight		Dead Nov. 17, 1931, of pneumonia+vaccinia.

HOW DOES DIPHTHERIA TOXIN EXERT ITS DETERRENT ACTION?

The fact that rabbits vaccinated with the virus-raw-toxin mixtures ran febrile courses, often with the development of secondary papules, together with the development of a subsequent immunity, proves that the virus was not killed by the toxin. Moreover, when rabbits which had been previously immunized against diphtheria, to the extent that they were Schick negative, were vaccinated with the virus-raw-toxin mixtures, no deterrent action was apparent. It was also found that when sufficient diphtheria antitoxin to prevent the "Schick" response was added to the virus-raw-toxin mixture the deterrent effect upon the "take" was also obliterated. It must be concluded, therefore, that the effect described is the result of the local cellular reaction engendered by the toxin at the site of the vaccination. This conclusion is supported by the fact that other agents which call forth a reaction may also exert a deterrent influence upon the local vaccine "take." For instance, it was found that a culture of N. Y. 5 scarlet fever streptococci, when added to vaccine virus, caused a definite deterrent action upon cutaneous vaccinations in rabbits, though less marked than was the case when diphtheria toxin was employed.

TABLE 3.—*Influence of Schick reaction upon subsequent vaccination in reaction area*

Rabbit No.	Date Schick tested	Date vaccinated	Interval in days between Schick test and vaccination	Vaccination results		Remarks
				Schick test area	New site	
1628	Dec. 4, 1931	Dec. 5, 1931	1	+	+++	
1627	do	do	1	±	++++	
1626	do	Dec. 7, 1931	3	±	++++	
1625	do	do	3	+++	+++	
1524	do	do	3	−	++++	Dec. 17, 1931, dead of vaccinia.
1623	do	Dec. 9, 1931	5	++	++++	
1622	do	do	5	+++	++++	
1609	Nov. 17, 1931	Dec. 7, 1931	20	−	+++	
1608	do	do	20	++	++	
1606	do	do	20	±	++	

± = Questionable virus response.
+ = Definite but slight take.
++ = Slight necrosis, local edema.
+++ = Moderate necrosis, marked local edema.
++++ = Large necrosis with extensive massive edema.

Moreover, it was found that the site of a positive Schick response in rabbits remains relatively refractory to vaccine virus for at least 20 days, at which time the presence of toxin at the site seems improbable (see Table 3). A similar tendency was noted by Ledingham for areas previously injected with India ink or with cultures of *Streptococcus erysipelatis.*

SUMMARY

1. Diphtheria toxin when added in suitable amounts to vaccine virus exerts a deterrent local action upon the "take" in rabbits and renders the systemic response less severe.

2. The deterrent action of diphtheria toxin upon vaccinia is neutralizable by diphtheria antitoxin.

3. The deterrent action is apparently occasioned by the local cellular reaction rather than by any direct action of the diphtheria toxin upon the virus.

4. The site of a positive Schick response in rabbits remains relatively insusceptible to vaccine virus for at least 20 days.

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A STUDY OF SOME VITAMIN B ADSORBATES

By Victor Birckner, *Associate Biochemist, National Institute of Health*

The use of fuller's earth or similar adsorbents for removing vitamin B from extracts of yeast or other raw materials, as proposed by Seidell (1), has often been resorted to as a means for concentrating this vitamin. An adsorbate of this type has been recommended as the international standard antineuritic vitamin preparation by the Conference on Vitamin Standards held in London in June, 1931 (2). More precise information in regard to the chemical character of such adsorbates is, therefore, much to be desired.

Although, when applied under proper conditions, fuller's earth is a very good adsorbent for the vitamin B complex, it always simultaneously adsorbs and carries down with it from the crude extract other substances besides the vitamin. The elimination of these co-adsorbed impurities at a later stage in processes for isolating vitamin B fractions is attended with difficulties and losses.

The underlying reason for the present study was the belief that a better knowledge of the nature, or of the properties, of these co-adsorbed impurities might conceivably lead to an improved method for their elimination. The same idea has recently been expressed by Van Veen (3), in connection with his studies on the isolation of the antineuritic vitamin from rice polishings. In our case, fresh bottom yeast from a near-by brewery was the source of the vitamin, and fuller's earth from Surrey, England, the adsorbent.

The immediate plan was to inquire to what extent adsorbates made from crude extracts of fresh brewers' yeast will contain, besides the adsorption compounds of vitamin B and other bases, loosely attached substances, and whether these and possibly other co-adsorbed impurities of the vitamin can be removed from the adsorbates by the use of inexpensive solvents without too great an impairment or loss of vitamin.

Very little information regarding these points can be found in the literature. A. de Cugnac (4) reported that the vitamin B fuller's earth adsorption complex is insoluble in formic acid. This acid, therefore, belongs to the group of liquids which, like water, fail to dissolve the vitamin when adsorbed on fuller's earth, although they are good solvents for the "free" vitamin. (This group of liquids does not include acetone, because in the absence of water acetone apparently

will not dissolve either "free" vitamin B or its adsorption compounds with fuller's earth.)

Narayanan and Drummond (5) studied the action of two acid and two alkaline liquids on a fuller's earth adsorbate of the pellagra-preventing factor of vitamin B from yeast. The adsorption compound was practically insoluble in the four liquids tried. The authors noted that the solvents in each case removed organic material; like De Cugnac, however, they were not interested in removing impurities, but only in finding a solvent for the adsorbed vitamin.

The present experiments were carried out with adsorbates prepared by two different methods. The two materials will be referred to for convenience as adsorbate P and adsorbate S. The latter was prepared from an aqueous extract of brewers' yeast in the manner described by Seidell (6), whereas the adsorbate P was made by treating pressed brewers' yeast essentially in the same manner which Pirie (7) has recently used for extracting the glutathione, then diluting the mixture with water, separating by means of a Sharples supercentrifuge, adding fuller's earth to the effluent, and washing and recovering the adsorbate.

Both adsorbate P and adsorbate S were hygroscopic gray powders which, as indicated in Table 3, contained nearly the same amounts of vitamin B.

The substances whose solvent action on the two adsorbates has been studied so far belong to three groups, namely:

(1) Neutral organic solvents of low boiling point, especially acetone.

(2) Mixtures of water and acetic acid varying in concentration from 50 to 100 per cent acid.

(3) A dilute aqueous solution of two mineral acids prepared by mixing equal parts of 1 per cent hydrochloric and 1 per cent hydrofluoric acid.

The latter mixture is referred to in this paper as Rather's reagent. Its use was decided upon after it had been observed that this mixture of dilute mineral acids, when applied to 1-gram portions of our fuller's earth preparations in the manner prescribed by Rather (8), would dissolve a large portion of the organic matter. (See second and third columns of figures in Tables 1A and 1B.)

The extraction experiments with low boiling solvents were carried out in Soxhlet extractors. One hundred grams of predried adsorbate was the quantity usually treated in each apparatus. The extractions were allowed to proceed for at least 9 or 10 days, during which time a calcium chloride tube was attached to the condensor of each apparatus. After an extraction was finished the residual adsorbate was freed from solvent by gentle heating, while the extract was filtered and evaporated in a tared dish or beaker. Volatile substances were driven off during this treatment, and, in weighing the dried residue, only the weight of the extracted nonvolatile matter which

had a dark brown, oily appearance and an acid reaction, was determined.

The first solvents tried were U.S.P. chloroform and acetone. The latter was dried with calcium chloride and redistilled before use. Adsorbate P which had been dried in a vacuum desiccator over sulphuric acid was used for these experiments. It was found by means of Seidell's preventive pigeon test (9) that through exhaustive extraction with either acetone or chloroform the adsorbates suffered no loss of vitamin. The amount of nonvolatile impurities removed was 0.75 grams from 100 grams of adsorbate P when using acetone and 0.10 grams when using U.S.P. chloroform. For the purpose of purifying an adsorbate of this type, acetone should, therefore, be given preference over U.S.P. chloroform.

Since, as shown in Table 1A, the total quantity of adsorbed organic matter contained in 100 grams of the original adsorbate P was 6.12 grams, the 0.75 grams of nonvolatile extract (assuming the latter to consist wholly of organic matter) would represent approximately 12 per cent of the adsorbed organic matter contained in adsorbate P. The higher proportion of acetone soluble (fatty) material in adsorbate P as compared with adsorbate S (see below) is doubtless due to the fact that fat solvents, namely, ethanol and ether, had been used in its preparation from pressed yeast in accordance with the method of Pirie (7). Seidell and Birckner (10) after attempting to extract and concentrate the vitamin B from an adsorbate of this type by a method which was known to be applicable to adsorbates prepared from aqueous extracts of yeast, reported that in this case their final product was unsatisfactory. It is possible that their failure was due in no small degree to the higher proportion of fatty impurities which were undoubtedly present in the "activated solid" prepared after treatment of the yeast with Pirie's reagent.

It was found that when acetone is brought in contact with a vitamin B adsorbate of the type here dealt with it not only acts as a solvent for loosely adsorbed substances but a portion of it is retained by the adsorbate. It may be inferred from the liberation of heat and the increase in weight that a chemical combination between acetone and fuller's earth has taken place. This is also indicated by the fact illustrated in Tables 1A and 1B that the acetone-treated adsorbates from which the free acetone had been wholly removed contained considerably more adsorbed organic matter than the untreated adsorbates (in spite of the fact that certain substances had been dissolved from the latter). The solvent effect of the acetone is, therefore, not apparent from the data in the second column of these tables.

In another experiment the adsorbate P prior to extraction with acetone had been heated in the drying oven at the temperature of

94° C. for about two days. The grey color of the adsorbate had thereby been changed to a tan. The amount of nonvolatile material removable by acetone from 100 grams of this heated adsorbate was only 0.6 grams, instead of 0.75 grams removed from the unheated adsorbate P. There are indications that on being heated the original adsorbate P not only undergoes oxidation but that some of its constituents are volatilized at the same time. To the latter factor may be due the lower yield of nonvolatile acetone-soluble extract above reported.

The results obtained by extracting adsorbate S with acetone were similar to those obtained in the case of adsorbate P. Prior to extraction the adsorbate S had been heated for several hours in the drying oven at 95° C. and finally for a few minutes at 110° C. The quantity of nonvolatile impurities removed with acetone from 100 grams of this adsorbate was 0.54 grams, which in this case was only about 5 per cent of the total adsorbed organic matter.

The treatments with acetic acid and with the mixture of dilute mineral acids were carried out by placing equal quantities of the respective adsorbate, which in these cases had been pre-extracted with acetone, into two 250-cubic centimeter Pyrex centrifuge bottles, adding about 150-200 cubic centimeters of the acid solvent and immersing the stoppered bottles in a water bath at 77–79° C. for one-half hour with frequent shakings. The mixtures were then centrifuged, the solutions poured off, and the residues stirred up with fresh solvent and digested and centrifuged in the same manner several times. The residues were finally freed from solvent, dried, and fed to pigeons as sole supplements to polished rice. The extracts were collected in volumetric flasks and aliquot portions were used for the analyses.

Immediately preceding the extractions with 70 and 90 per cent acetic acid, respectively, several extractions with 100 per cent acetic acid were made in the case of adsorbate P. Since, however, as indicated in Table 2, very little material was dissolved by the 100 per cent acid, these treatments were omitted in the case of adsorbate S.

It was thought that analytical data on the variously treated adsorbates and on the resulting extracts would be helpful in evaluating the relative efficacy of the different purification procedures studied. It was, therefore, decided to determine in some of these materials the percentage of nitrogen as well as that of total organic matter For the latter purpose the method proposed by Rather (8) was tried, only to be abandoned when it was found that it gave results which were obviously much too low. The adsorbed organic matter was finally determined by igniting in a well-controlled electric muffle the carefully dried preparations and deducting from the loss on ignition the loss on ignition of the dried fuller's earth alone after it had been subjected to the same treatment as that employed in the preparation of

the respective adsorbate. The figures for organic matter in Tables 1A and 1B are, therefore, the losses on ignition as found, less the respective loss on ignition of the fuller's earth alone.

TABLE 1A.—*Changes in composition of adsorbate P due to treatment with acetone and to exposure to different temperatures*

Description of material	Total nitrogen by Kjeldahl method	Total adsorbed organic matter	Organic matter, insoluble in Rather's reagent
	Per cent	*Per cent*	*Per cent*
Original unheated material, dried in vacuo over P_2O_5	1.37	6.12	2.37
Original unheated material, defatted with acetone	1.30	9.3[illegible]	1.87
Original material heated for 2 days at 62° C. and dried	1.41	6.1[illegible]	2.90
Original material heated for 2 days at 91° C.	1.43	7.08	2.67
Material heated to 91° C. then defatted with acetone	1.30	9.10	1.98
Original material, dried at 100° C.	1.41	7.01	1.47

TABLE 1B.—*Changes in composition of adsorbate S due to heat-drying and to extraction with acetone and Rather's reagent*

Description of material	Total nitrogen by Kjeldahl method	Total adsorbed organic matter	Organic matter, insoluble in Rather's reagent
	Per cent	*Per cent*	*Per cent*
Original unheated material, dried in vacuo over P_2O_5	1.88	10.58	4.02
Original material, dried at 103° C.	1.90	10.92	2.22
Original material heated 4 hours at 95°, then 5 minutes at 110°, then defatted with acetone	1.74	12.84	4.45
Same material after additional treatment with Rather's reagent	1.80	11.68	(1)

1 Not determined

The above tabulations contain interesting information, yet the data are likely to be misleading unless they are carefully interpreted. From the nitrogen figures in conjunction with those for total adsorbed organic matter it follows with certainty only that for the original adsorbates P and S the nitrogen content of the organic matter was about 22 and 18 per cent, respectively. It would be incorrect to conclude that the treatment with Rather's reagent had removed no appreciable quantities of nitrogen or organic matter. As a matter of fact, Rather's mixture in acting upon the defatted adsorbate S had dissolved over one-third of the solid material. The precise record of this experiment was as follows:

Amount of material treated, 35.4 g., containing { 4.545 g. organic matter.
0.616 g. nitrogen.
319 vitamin (pigeon) units.

Amount of insoluble residue after 6 treatments with Rather's mixture and 3 washings with water, 22.4 g , containing............................. { 2.616 g. organic matter. 0. 403 g. nitrogen. 287 vitamin units

Material (per cent) removed by the treatment: 36.72 for total solids, 42.14 for organic matter, 34 58 for nitrogen, 10 for vitamin B.

With reference to the above data and those in Tables 1A and 1B, it is therefore to be noted that it is not permissible to base calculations regarding nitrogen distribution solely on the nitrogen content of the solid residues as seems to have been done by Van Veen [1] (3).

In Tables 1A and 1B the gradual increase in the percentage of adsorbed organic matter with exposure of the adsorbates to higher temperatures is doubtless due to oxidation. The latter is a phenomenon of great prominence with these preparations, and it tends to overshadow other interesting properties.

While, as stated above, Rather's method for determining total organic matter was not applicable to our preparations, the results obtained with this method were nevertheless of very great interest. In the last columns of Tables 1A and 1B are, therefore, shown the percentages of organic material insoluble in Rather's mixture of dilute hydrochloric and hydrofluoric acids. The results are in this case not obscured and incumbered by oxidizable or oxidized materials, since apparently the bulk of these substances, together with a good many ingredients of the original fuller's earth, had been dissolved out. The acetone-fuller's earth adsorption compound, whose presence had caused abnormally high values for the total adsorbed organic matter, had also apparently been dissolved by the Rather reagent, with the result that in the last columns of Tables 1A and 1B the purifying effect of the acetone treatments is, at least in the case of adsorbate P, well demonstrated.

Above all, by applying the Rather method in conjunction with a reliable method for the estimation of the adsorbed organic matter, the fact was revealed that a large proportion of the organic ingredients of our fuller's earth preparations was soluble in Rather's reagent. Since, on the other hand, the fuller's earth adsorption compounds of the vitamin B fractions are known to be very resistant to the action of acids, it followed at once that Rather's mixture containing hydrofluoric acid, should be particularly well suited for purifying adsorbates of the type here dealt with. A preliminary experiment to study this point was, therefore, carried out with our defatted adsorbate S. The chemical changes effected have already been reported. The proportion of material treated with the acid mixture in this experiment was

[1] Van Veen also appears to be in error when he states that his acid clay adsorbate contained nearly 9 per cent of organic matter. Since the loss on ignition of his clay alone was 5 per cent and that of the adsorbate 10 per cent, the amount of adsorbed organic matter can only have been about 5 per cent. Hence, by the subsequent treatment with barium hydroxide Van Veen probably dissolved from one-half to two-thirds of the organic matter, instead of only one-fourth as stated in his paper.

considerably higher than that prescribed in Rather's analytical method, while the temperature during the digestions was only 77–79° C. It is perhaps due to these factors that, in the case of this experiment, only slightly over one-third of the adsorbed nitrogen and organic matter was dissolved by the acid mixture. A decrease, amounting to one-tenth of the total, in the vitamin B content of the residue had occurred in consequence of the digestions. The precise cause of this loss is not known at present. It is hoped, however, that by further experimentation with combinations of dilute mineral acids analogous to the one here employed a procedure may be developed for appreciably purifying previously defatted vitamin B adsorbates on fuller's earth without at the same time causing any appreciable loss of active substance.

The extraction of our two adsorbates with acetone has been discussed above. It should be added that as revealed by the odor during evaporation, the acetone extract contained also, at least in the case of adsorbate P, a certain undetermined amount of volatile ingredients. Since it followed from the experiments referred to that in the absence of water acetone will not dissolve the vitamin B adsorption compounds on fuller's earth, it seemed of interest to compare the behavior of this solvent toward the vitamin B as found in dried brewer's yeast. The following experiment with a commercial brand of dried brewer's yeast was, therefore, made:

A shallow layer of the ground yeast was placed in a vacuum desiccator over calcium chloride for three days. Eighty-three grams of the dry material were then extracted for a period of 13 days with dried, redistilled acetone, using a Soxhlet apparatus. The acetone dissolved fatty and resinous ingredients, and the undissolved residue, after evaporation of the solvent, was approximately 2.1 per cent lighter than the material at the start. Proportional amounts, namely, 0.39 and 0.40 grams per day, respectively, of the acetone-treated and of the untreated yeast were now fed to two groups of pigeons as the sole supplements to polished rice in the manner employed by Seidell (9). The average total change in weight of each pigeon during the 11-day feeding period was as follows:

For the birds receiving the untreated yeast.. ... −4.5 grams;
For the birds receiving the acetone-extracted yeast...... +1.0 gram.

It is, therefore, evident that through the prolonged extraction with acetone the yeast had not suffered any loss of vitamin B.

In the case of the acetic acid treatments of our two adsorbates, nitrogen determinations before and after extraction showed nothing of significance; and since the residues were obviously contaminated with various basic acetates (and possibly a fuller's earth adsorption compound of the acetic acid itself), it was deemed useless to attempt

a determination of the organic matter. In the case of adsorbate P some analytical determinations on the acetic acid extracts were made, however. These results which were obtained after driving off the free acetic acid, were as follows:

TABLE 2.—*Materials found in the acetic acid extracts of 100 grams of adsorbate P previously defatted with acetone*

Description of extract	Total solids	Ash	Nitrogen
	Grams	*Grams*	*Grams*
100 per cent acetic acid	0.37	0.11	0.0010
100 per cent, followed by 90 per cent acetic acid	{0.37, 1.15} 1.52	{0.11, 0.36} 0.47	{0.0040, 0.0157} 0.0197
100 per cent, followed by 70 per cent acetic acid	{0.37, 1.91} 2.28	{0.11, 0.57} 0.68	{0.0040, 0.0157} 0.0197

A considerable, as yet undetermined, portion of these dissolved substances consisted not of co-adsorbed impurities, but of the acetates of inorganic bases removed from the fuller's earth by the hot acetic acid. For this reason only the nitrogen figures can be regarded as a criterion for the relative amounts of co-adsorbed impurities removed by these treatments. It is noteworthy that the 100 per cent acetic acid dissolved much less material than the 90 per cent and the 70 per cent acid. As is shown by the data in Table 3, the adsorbates, as a result of the treatments with acetic acid, had suffered no loss of vitamin B.

It remains to record briefly the feeding tests on pigeons with our variously treated fuller's earth preparations. These results are tabulated herewith:

TABLE 3.—*Changes in the body weights of pigeons which received as sole supplement to polished rice the variously treated adsorbates P and S*

Experiment No.	Description of vitamin supplement fed in addition to polished rice	Average daily dose	Number of pigeons used	Duration of test	Average total change in weight per pigeon
		Mg.		*Days*	*Grams*
I	No vitamin supplement	...	4	11	−40.8
II	Unheated adsorbate P	125	5	10	−0.4
	Unheated adsorbate P, exhaustively extracted with acetone.	125	3	10	+0.7
III	Unheated adsorbate P, extracted first with acetone, then with 100 per cent acetic acid.	130	3	14	+3.0
	Unheated adsorbate P, extracted in succession with acetone, 100 per cent, and 70 per cent acetic acid.	130	2	14	+5.0
	Unheated adsorbate P, extracted in succession with acetone, 100 per cent, and 90 per cent acetic acid.	130	2	14	+15.0
IV	Adsorbate P, dried at 94° C	130	3	11	−13.3
	Adsorbate P, dried at 94° C., then extracted with acetone.	130	3	11	−11.0
	Adsorbate P, dried at 94° C., then extracted with mixture of acetone and 100 per cent acetic acid	130	3	11	−9.0
V	Adsorbate S	130	3	12	−5.0
	Adsorbate S, exhaustively extracted with acetone	130	4	12	−8.0
VI	Adsorbate S, exhaustively extracted with acetone	106	4	12	−8.0
	Adsorbate S, extracted first with acetone, then with 50 per cent acetic acid.	106	4	12	−10.5
	Adsorbate S, extracted first with acetone, then with 70 per cent acetic acid.	106	4	12	−6.8
VII	Adsorbate S, exhaustively extracted with acetone	111	5	10	+0.2
	Adsorbate S, extracted first with acetone, then with Rather's reagent.	111	5	10	−7.4
	Adsorbate S, extracted first with acetone, then with Rather's reagent.	123	4	10	−0.8

The pigeons which served for Experiments I to V belonged to a lot of 20 birds which had been on the basal diet of polished rice for several months at the time the present experiments were begun. Other pigeons were used for Experiments VI and VII. In each experiment the birds of the different groups were kept in the same large cage, and the comparative feeding tests with the different materials were carried out simultaneously.

In preparing the supplementary doses, the changes in weight which the adsorbates had undergone by being acted upon by the respective solvent were taken into account as far as possible. However, in the first column of figures in Table 3 the dosage is always expressed in terms of the respective untreated material.

It follows from Experiments II and IV that, in the case of adsorbate P, prolonged exposure to the temperature of 94° C. had caused some impairment of the vitamin B function.

SUMMARY

Vitamin B adsorbates on fuller's earth, when prepared from extracts of brewers' yeast, were found to contain impurities of a fatty nature. When these were removed from the dried adsorbates by means of acetone, it was found that the insoluble residue retained all of the vitamin B activity.

When for the original extraction of the yeast water alone had been used (adsorbate S), the proportion of the acetone-soluble nonvolatile impurities contained in the fuller's earth adsorbate was as low as 5 per cent of the total adsorbed organic matter. In a case where fat solvents had entered into the extraction of the yeast, the proportion of the acetone-soluble impurities was higher (10 to 12 per cent in our adsorbate P).

In making the extractions with acetone, a portion of the latter was retained by the adsorbates, and, consequently, the percentage of organic matter in the adsorbates, as well as their total weight, instead of being decreased by the removal of fatty matter, were increased by the treatments with acetone.

When the defatted adsorbates were treated with acetic acid of 70 to 100 per cent strength at a temperature of 77° to 79° C., a further small quantity of co-adsorbed impurities was dissolved without diminishing the vitamin potency of the insoluble residue.

A much larger portion of the co-adsorbed impurities was found to be removable from the defatted adsorbates by a mixture of equal volumes of 1 per cent hydrochloric and 1 per cent hydrofluoric acid (Rather's reagent). A 10 per cent decrease in the vitamin potency of the insoluble residue resulted from a preliminary trial with this treatment.

It is probable that extraction of vitamin B fuller's earth adsorbates with acetone and subsequently with a mixture of mineral acids similar to the one just referred to could be introduced as a useful intermediary step whenever the extraction of the vitamin from the adsorbate and the ultimate isolation of the active substance are being attempted.

A method has been indicated for the accurate determination of the adsorbed organic matter present in fuller's earth adsorbates of organic materials.

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DEATHS DURING WEEK ENDED DECEMBER 17, 1932

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Dec. 17, 1932	Corresponding week 1931
Data from 85 large cities of the United States:		
Total deaths	8,865	8,001
Deaths per 1,000 population, annual basis	12.7	11.6
Deaths under 1 year of age	646	581
Deaths under 1 year of age per 1,000 estimated live births [1]	53	46
Deaths per 1,000 population, annual basis, first 50 weeks of year	11.1	11.7
Data from industrial insurance companies:		
Policies in force	69,459,495	74,393,230
Number of death claims	13,769	13,091
Death claims per 1,000 policies in force, annual rate	10.4	9.6
Death claims per 1,000 policies, first 50 weeks of year, annual rate	9.5	9.6

[1] 1932, 81 cities; 1931, 77 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended December 24, 1932, and December 26, 1931

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended December 24, 1932, and December 26, 1931

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Dec. 24, 1932	Week ended Dec. 26, 1931	Week ended Dec. 24, 1932	Week ended Dec. 26, 1931	Week ended Dec. 24, 1932	Week ended Dec. 26, 1931	Week ended Dec. 24, 1932	Week ended Dec. 26, 1931
New England States:								
Maine		17	2	3	2	698	0	0
New Hampshire		1				7	1	0
Vermont	1				1	88	0	0
Massachusetts	37	50	8	7	140	219	2	0
Rhode Island	2	5	2			473	0	0
Connecticut	15	8	24	5	18	58	1	1
Middle Atlantic States:								
New York	52	119	[1] 177	[1] 13	441	160	5	4
New Jersey	29	20	50	7	170	22	1	1
Pennsylvania	113	88			261	432	3	6
East North Central States:								
Ohio	30	101	47	2	311	103	0	2
Indiana	59	85	1,454	26	13	39	5	9
Illinois	73	95	336		12	29	14	3
Michigan	25	40	74		271	15	0	3
Wisconsin	7	8	492	24	409	21	0	0
West North Central States:								
Minnesota	9	19	45	1	271	11	1	1
Iowa	25	24	8			2	0	0
Missouri	15	55	384	6		3	3	4
North Dakota	6	10			131		1	0
South Dakota	3	5	208			33	0	0
Nebraska	16	20	941		18	25	1	1
Kansas	21	38	(3)	2	9	12	2	1
South Atlantic States:								
Delaware		11	3		1	1	0	0
Maryland [3]	18	61	353	22	3	10	0	0
District of Columbia	3	12	54		2		0	0
Virginia	11				92		3	
West Virginia	24	41	517	8	150	258	0	1
North Carolina [4]	22	30	340	4	62	35	1	1
South Carolina	5	9	1,000	252	43	9	0	0
Georgia [4]	11	29	2,429	35		2	1	1
Florida		19	53	1	1		0	1

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended December 24, 1932, and December 26, 1931— Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Dec 24, 1932	Week ended Dec 26, 1931	Week ended Dec 24, 1932	Week ended Dec 26, 1931	Week ended Dec. 24, 1932	Week ended Dec 26, 1931	Week ended Dec. 24, 1932	Week ended Dec. 26, 1931
East South Central States:								
Kentucky	29	42	1,004				7	0
Tennessee	22	52	2,915	31	6	8	0	5
Alabama [4]	22	43	3,965	21	1	28	1	0
Mississippi	9	36					1	0
West South Central States								
Arkansas	12	19	9,795	7	4	11	1	1
Louisiana [4]	23	33	9,162	8		2	1	1
Oklahoma [5]	11	32	2,[illegible]03	23		7	0	0
Texas	84	74	2,838	7	361	3	0	0
Mountain States:								
Montana	1	1	4,200		191	43	0	0
Idaho	3	2	2		2		0	0
Wyoming		2	243			3	0	0
Colorado	10	3	263		7	5	0	1
New Mexico	10	27	11	1		8	0	1
Arizona	1	6	33	3			0	0
Utah [4]	1		47	1	1	3	1	0
Pacific States:								
Washington	7	1	232		3	149	1	0
Oregon		2	1,552	34	39	9	0	0
California	39	60	1,068	79	48	43	4	2
Total	916	1,472	48,624	632	3,555	3,183	62	50

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Dec. 24, 1932	Week ended Dec. 26, 1931	Week ended Dec. 24, 1932	Week ended Dec. 26, 1931	Week ended Dec. 24, 1932	Week ended Dec. 26, 1931	Week ended Dec. 24, 1932	Week ended Dec. 26, 1931
New England States:								
Maine	1	0	31	18	0	0	4	2
New Hampshire	0	0	16	12	0	0	0	0
Vermont	0	0	2	10	0	25	0	1
Massachusetts	0	2	309	292	0	0	6	1
Rhode Island	0	0	11	25	0	0	0	0
Connecticut	1	1	83	57	13	12	2	1
Middle Atlantic States:								
New York	0	7	470	309	3	3	7	23
New Jersey	0	2	182	113	0	0	2	1
Pennsylvania	5	2	506	128	0	0	21	10
East North Central States:								
Ohio	1	2	236	419	17	6	2	10
Indiana	0	1	84	83	4	8	5	3
Illinois	1	2	390	257	1	36	4	19
Michigan	0	4	387	246	1	7	8	8
Wisconsin	0	1	76	106	3	13	0	0
West North Central States:								
Minnesota	0	1	70	75	0	6	0	1
Iowa	0	1	40	35	19	48	1	5
Missouri	0	1	24	55	0	14	2	6
North Dakota	0	0	7	17	5	11	0	0
South Dakota	0	0	14	7	2	3	0	6
Nebraska	1	0	40	19	2	12	0	0
Kansas	4	0	73	61	2	8	5	1
South Atlantic States:								
Delaware	0	0	10	6	0	0	0	1
Maryland [3]	0	0	94	74	0	0	7	9
District of Columbia	0	0	10	8	0	0	0	1
Virginia	0	1	52		1		6	
West Virginia	0	1	61	49	0	2	7	14
North Carolina [4]	0	2	60	49	1	0	2	8
South Carolina	0	0	5	7	0	0	0	8
Georgia [4]	1	0	9	7	0	0	3	5
Florida	0	1	6	0	0	1	1	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended December 24, 1932, and December 26, 1931—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Dec. 24, 1932	Week ended Dec. 26, 1931	Week ended Dec. 24, 1932	Week ended Dec. 26, 1931	Week ended Dec. 24, 1932	Week ended Dec. 26, 1931	Week ended Dec. 24, 1932	Week ended Dec. 26, 1931
East South Central States:								
Kentucky	1	0	23	66	2	0	10	9
Tennessee	0	1	28	63	1	0	4	18
Alabama [4]	0	0	28	45	1	1	0	16
Mississippi	0	0	7	11	0	6	1	3
West South Central States:								
Arkansas	0	0	11	27	0	7	2	5
Louisiana [4]	0	0	7	12	8	0	3	39
Oklahoma [5]	0	0	26	36	3	1	0	8
Texas	0	1	78	58	6	9	2	12
Mountain States:								
Montana	1	1	8	35	0	13	1	1
Idaho	1	0	2	3	2	0	1	0
Wyoming	0	0	3	2	0	0	0	0
Colorado	0	0	28	23	0	11	0	0
New Mexico	0	1	11	17	0	0	1	10
Arizona	0	1	3	6	0	0	0	1
Utah [3]	0	0	10	7	0	0	0	0
Pacific States:								
Washington	2	1	37	35	0	15	3	1
Oregon	0	1	16	11	0	5	1	2
California	2	1	131	90	4	1	6	3
Total	22	40	3,865	3,461	107	323	130	265

[1] New York City only.
[2] The department of health of Kansas, after circularizing local health officers in the State, estimated that there were 78,624 cases of influenza in Kansas.
[3] Week ended Friday.
[4] Typhus fever, week ended Dec. 24, 1932, 7 cases: 1 case in North Carolina, 3 cases in Georgia, 2 cases in Alabama, and 1 case in Louisiana.
[5] Figures for 1932 are exclusive of Oklahoma City and Tulsa.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
September, 1932										
Massachusetts	7	70	6	1	94	1	12	303	0	30
October, 1932										
New Hampshire		3					0	61	0	
November, 1932										
Georgia		266	309	385	3	20	1	103	0	55
Illinois	44	424	150	0	223		18	1,406	2	71
Louisiana	3	102	1,583	72	21	11	3	99	5	25
New Hampshire		1					0	81	0	
New Mexico	21	86	753		4		0	43	1	18
Ohio	8	320	492		582		6	2,098	111	58
Rhode Island	2	23			5		0	147	0	2
South Dakota	1	24	6		8		1	45	4	5
West Virginia	3	179	117		241		2	235	0	53

September, 1932

Massachusetts:	Cases
Chicken pox	81
Dysentery	4
German measles	34
Lead poisoning	2
Lethargic encephalitis	2
Mumps	111
Ophthalmia neonatorum	46
Septic sore throat	9
Tetanus	2
Trachoma	2
Trichinosis	1
Whooping cough	[illegible]03

November, 1932

	Cases
Chicken pox:	
Georgia	27
Illinois	2,003
Louisiana	36
New Mexico	68
Ohio	2,662
Rhode Island	63
South Dakota	182
West Virginia	258
Conjunctivitis:	
New Mexico	1
Dysentery:	
Georgia	7
Illinois (bacillary)	7
Louisiana	2
Ohio	3
Food poisoning:	
New Mexico	3
Ohio	14
German measles:	
Illinois	18
New Mexico	2
Ohio	16
Rhode Island	1
Hookworm disease:	
Louisiana	17
Lead poisoning:	
Illinois	1
Ohio	10
Leprosy:	
Louisiana	2
Lethargic encephalitis:	
Georgia	1
Illinois	8
Mumps:	
Georgia	16
Illinois	139
Louisiana	1
New Mexico	12
Ohio	125
Rhode Island	16
South Dakota	11
West Virginia	1
Ophthalmia neonatorum:	
Illinois	5
Ohio	84
Paratyphoid fever:	
Illinois	1
Puerperal septicemia:	
Illinois	2
New Mexico	1
Ohio	6
Rabies in animals:	
Illinois	2
Louisiana	3
Septic sore throat:	
Georgia	26
Illinois	16
Ohio	191
South Dakota	1
Tetanus:	
Illinois	3
Louisiana	10
Ohio	2
South Dakota	3
Trachoma:	
Illinois	3
Louisiana	10
Ohio	6
South Dakota	4
Trichinosis:	
Illinois	1
Tularaemia:	
Illinois	13
Ohio	11
Typhus fever:	
Georgia	30
Louisiana	1
Undulant fever:	
Illinois	8
Louisiana	5
New Mexico	1
Ohio	6
Vincent's angina:	
Illinois	23
Whooping cough:	
Georgia	44
Illinois	331
Louisiana	9
New Mexico	15
Ohio	328
Rhode Island	64
South Dakota	18
West Virginia	81

WEEKLY REPORTS FROM CITIES

City reports for week ended December 17, 1932

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	1		0	0	0	6	0	2	0	7	28
New Hampshire:											
Concord	0		0	0	1	0	0	0	0	0	9
Manchester	0		0	0	0	0	0	1	0	0	11
Nashua	0		0	0	0	1	0	0	0	0	0
Vermont:											
Barre	0		0	0	0	0	0	2	0	0	6
Massachusetts:											
Boston	19	3	1	45	36	80	0	9	1	60	240
Fall River	0		0	0	0	3	0	1	0	0	22
Springfield	0	1	0	0	7	9	0	1	0	2	38
Worcester	0		0	1	7	30	0	1	0	0	55
Rhode Island:											
Pawtucket	0		0	0	0	0	0	0	0	0	17
Providence	2	1	0	0	3	22	0	2	0	20	64
Connecticut:											
Bridgeport	0		0	6	4	5	0	1	0	0	27
Hartford	1	1	0	5	3	6	0	0	1	2	41
New Haven	0		0	0	4	3	0	1	0	6	31
New York:											
Buffalo	8	7	2	3	20	31	0	5	0	25	136
New York	43	45	14	265	170	184	0	76	8	110	1,467
Rochester	1	2	0	1	4	22	0	2	1	5	59
Syracuse	0		0	4	4	10	0	2	0	2	48
New Jersey:											
Camden	2		0	0	1	4	0	1	0	2	22
Newark	5	12	0	49	7	21	0	5	0	9	94
Trenton	3	4	0	1	5	9	0	1	0	2	39
Pennsylvania:											
Philadelphia	10	8	6	17	43	114	0	28	0	4	430
Pittsburgh	5	82	33	1	68	48	0	12	0	9	274
Reading	1		0	4	7	8	0	1	0	1	26
Scranton	1			1		7	0		0	2	

City reports for week ended December 17, 1932—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Ohio:											
Cincinnati	3	7	8	0	14	22	0	4	0	1	142
Cleveland	7	281	10	3	26	71	0	8	0	16	206
Columbus	3	17	11	75	14	10	0	4	0	1	120
Toledo	3	8	1	11	8	34	0	3	0	0	82
Indiana:											
Fort Wayne	0		1	0	1	3	0	0	0	0	28
Indianapolis	6		3	8	22	9	0	2	3	4	
South Bend	0		1	0	1	3	0	0	0	1	17
Terre Haute	0		0	1	5	4	0	1	0	0	16
Illinois:											
Chicago	11	71	20	36	78	175	0	35	1	12	803
Springfield	1	9	0	0	1	4	0	1	0	0	22
Michigan:											
Detroit	24	32	4	58	27	105	0	25	1	55	242
Flint	1	24	1	2	5	6	0	0	0	4	31
Grand Rapids	1		4	1	3	10	0	0	0	27	
Wisconsin:											
Kenosha	0	1	1	0	0	2	2	0	0	1	9
Madison	0			5		3	0		0	8	
Milwaukee	4	5	4	2	14	11	0	7	0	14	110
Racine	0		0	0	2	10	0	0	0	1	13
Superior	0		0	0	0	0	0	0	0	7	9
Minnesota:											
Duluth	0		3	0	4	3	0	0	0	5	42
Minneapolis	1	4	9	18	17	17	0	0	0	4	105
St. Paul	0	2	2	2	5	18	0	2	0	23	80
Iowa:											
Des Moines	7			0		6	0		0	0	46
Sioux City	2			1		3	0		0	0	1
Waterloo	0			0		0	0		0	0	
Missouri:											
Kansas City	2	2	4	14	35	35	0	8	0	0	88
St. Joseph	1		2	0	15	4	0	1	0	0	39
St. Louis	15	10	5	0	13	15	0	11	1	1	249
North Dakota:											
Fargo	0		0	0	1	0	0	[1]2	0	0	8
Grand Forks	0		0	30	0	0	0	0	0	0	0
South Dakota:											
Aberdeen	0		0	0	0	2	0	0	0	0	
Nebraska:											
Omaha	8		0	0	16	9	1	2	0	0	74
Kansas:											
Topeka	2		0	2	4	3	0	0	0	2	8
Wichita	0		1	0	11	4	0	2	0	0	42
Delaware:											
Wilmington	1		0	1	2	3	0	0	0	0	23
Maryland:											
Baltimore	9	50	1	2	29	60	0	13	2	12	224
Cumberland	0	1	0	0	0	1	0	0	0	0	14
Frederick	1		0	0	0	3	0	0	0	0	5
District of Col.:											
Washington	5	64	4	0	23	12	0	10	0	5	175
Virginia:											
Lynchburg	1		0	1	1	1	0	0	0	0	13
Norfolk	0		0	0	4	0	0	3	0	0	27
Richmond	4		4	1	3	3	0	2	0	0	59
Roanoke	2		0	0	1	1	0	0	1	0	16
West Virginia:											
Charleston	0	15	2	0	8	3	0	1	0	0	17
Huntington	3			14		2	0		0	0	
Wheeling	0		0	67	7	2	0	0	0	9	18
North Carolina:											
Raleigh	0		0	0	4	1	0	1	0	0	22
Wilmington											
Winston-Salem	1		0	0	2	3	0	1	0	0	18
South Carolina:											
Charleston	1	66	3	0	1	2	0	5	0	0	31
Columbia	2		0	0	1	0	0	0	0	0	11
Greenville	0		0	2	0	0	0	0	0	0	
Georgia:											
Atlanta	11	1,442	20	0	7	3	0	0	0	7	87
Brunswick	0		0	0	0	0	0	0	0	0	4
Savannah	0	81	3	0	2	3	0	1	1	0	22
Florida:											
Miami	2	1	0	0	4	0	0	2	0	0	22
Tampa	4	2	1	0	1	1	0	0	0	1	11

[1] Nonresidents.

City reports for week ended December 17, 1932—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Kentucky:											
Covington											
Lexington	0	130	1	0	2	2	0	0	1	1	30
Louisville	8	74	2	0	20	7	0	3	0	3	106
Tennessee:											
Memphis	4		9	3	9	5	0	6	0	0	94
Nashville											
Alabama:											
Birmingham	4	884	18	0	10	7	0	4	0	0	104
Mobile	1	50	7	0	4	1	1	0	0	0	34
Montgomery	0	94		0		0	0		0	0	
Arkansas:											
Fort Smith											
Little Rock	0	1	0	0	0	2	0	0	0	0	
Louisiana:											
New Orleans	5	229	34	0	24	3	0	13	1	3	176
Shreveport	1		0	0	5	0	0	2	0	0	23
Oklahoma:											
Muskogee	1	13		0		3	2		0	0	
Tulsa	0			0		3	0		0	0	
Texas:											
Dallas	19	80	9	1	6	13	0	3	1	1	76
Fort Worth	6		5	0	6	14	0	1	0	0	36
Galveston	2		0	0	3	0	0	2	0	0	15
Houston	14		3	2	21	3	0	7	0	0	79
San Antonio	8	11	5	0	15	1	0	10	0	0	87
Montana:											
Billings	0		0	1	0	0	0	0	0	0	8
Great Falls	0		0	366	3	1	0	0	0	1	8
Helena	0	294	2	0	0	0	0	0	0	0	8
Missoula	0		0	0	0	1	0	0	0	0	6
Idaho:											
Boise	0		0	6	1	0	6	1	0	0	7
Colorado:											
Denver	3	307	12	7	32	13	0	4	0	1	112
Pueblo	0		1	0	2	0	0	1	0	0	10
New Mexico:											
Albuquerque	2	1	0	0	1	4	0	4	0	0	12
Arizona:											
Phoenix	0		0	0	3	0	0	4	0	0	
Utah:											
Salt Lake City	0		7	0	6	3	0	0	0	0	39
Nevada:											
Reno	0		0	0	0	0	0	0	0	0	1
Washington:											
Seattle	0			1		6	1		0	8	
Spokane	0			1		4	1		0	0	
Tacoma	0		1	0	1	2	0	1	0	0	25
Oregon:											
Portland	1	16	1	8	3	9	7	2	1	1	93
Salem	0	40		2		0	0		0	0	
California:											
Los Angeles	15	240	12	6	28	29	1	24	0	17	309
Sacramento	0	6	1	0	7	2	0	0	1	1	
San Francisco	2	126	10	2	16	3	0	15	1	26	218

City reports for week ended December 17, 1932—Continued

State and city	Meningococcus meningitis		Polio-myelitis cases
	Cases	Deaths	
Massachusetts:			
Boston	0	1	0
New York:			
Buffalo	1	0	0
New Jersey:			
Newark	0	0	1
Pennsylvania:			
Philadelphia	1	2	2
Pittsburgh	0	1	0
Ohio:			
Cleveland	0	0	1
Indiana:			
Indianapolis	2	2	0
Illinois:			
Chicago	7	3	0
Springfield	0	1	0
Michigan:			
Detroit	0	1	0
Minnesota:			
Duluth	2	0	0
Minneapolis	1	0	0
Missouri:			
Kansas City	3	2	0
Kansas:			
Topeka	2	2	0
District of Columbia:			
Washington	3	1	0
Kentucky:			
Louisville	0	1	0
Louisiana:			
New Orleans	2	0	0
Montana:			
Missoula	1	0	0
California:			
Los Angeles	0	2	2
Sacramento	1	0	0

Lethargic encephalitis.—Cases: New York, 2; Detroit, 2; Birmingham, 1.
Pellagra.—Cases: Baltimore, 1; Charleston, S. C., 1; Dallas, 1.
Typhus fever.—Cases: Charleston, S. C., 1; Tampa, 1.

FOREIGN AND INSULAR

CANADA

Provinces — Communicable diseases — Week ended December 10, 1932.—The Department of Pensions and National Health of Canada reports cases of certain communicable diseases for the week ended December 10, 1932, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis					1					1
Chicken pox		37		111	370	98	36	10	26	688
Diphtheria	2	2	5	33	19	4		3		68
Erysipelas				3		2			1	6
Influenza		11			540		6		534	1,091
Lethargic encephalitis					1					1
Measles		7	14	57	523	4	3	31	7	646
Mumps		24			115	30			16	185
Pneumonia, all forms		4			18				11	33
Scarlet fever		20	16	84	82	33	14	16	15	280
Smallpox					3		2			5
Trachoma						2			2	4
Tuberculosis		2	5	88	23	16	19		11	161
Typhoid fever	1		2	18	3	5	1			30
Undulant fever					3					3
Whooping cough		1		77	64	38	7	1	45	233

CUBA

Provinces—Communicable diseases—Four weeks ended November 12, 1932.—During the four weeks ended November 12, 1932, cases of certain communicable diseases were reported in the provinces of Cuba as follows:

Disease	Pinar del Rio	Habana	Matanzas	Santa Clara	Camaguey	Oriente	Total
Diphtheria		17	3	3	3		26
Malaria	100	33	22	90	80	19	344
Measles			3		2	11	16
Scarlet fever		3	3				6
Tuberculosis		13	2	10	2	22	49
Typhoid fever	3	22	4	4	8	7	48

CZECHOSLOVAKIA

Communicable diseases—August–October, 1932.—During the months of August, September, and October, 1932, certain communicable diseases were reported in Czechoslovakia as follows:

Disease	August		September		October	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
Anthrax	13	4	10		12	2
Cerebrospinal meningitis	7	5	6	3	7	3
Diphtheria	1,476	72	2,[illegible]07	120	1,58[illegible]	178
Dysentery	98	7	199	35	577	87
Malaria	66	1	[illegible]		11	1
Paratyphoid fever	32	1	28	1	13	2
Puerperal fever	10	25	27	11	[illegible]	10
Rabies	1	1				
Scarlet fever	1,160	17	1,930	12	[illegible]	28
Trachoma	161		140		181	
Typhoid fever	897	61	1,055	62	1,479	85
Typhus fever					6	2

YUGOSLAVIA

Communicable diseases—November, 1932.—During the month of November, 1932, certain communicable diseases were reported in Yugoslavia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	83	21	Poliomyelitis	24	3
Cerebrospinal meningitis	5	3	Scarlet fever	514	16
Diphtheria and croup	1,966	247	Sepsis	11	5
Dysentery	315	57	Tetanus	29	12
Erysipelas	196	9	Typhoid fever	1,697	172
Measles	263	7	Typhus fever	3	1
Paratyphoid fever	110				

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

(NOTE. A table giving current information of the world prevalence of the quarantinable diseases appeared in the Public Health Reports for December 30, 1932, pp. 2382-2391. A similar cumulative table will appear in the Public Health Reports to be issued January 27, 1933, and thereafter, at least for the time being, in the issue published on the last Friday of each month.)

Cholera

Philippine Islands.—During the week ended December 24, 1932, cholera was reported in the Philippine Islands as follows: Leyte Province, 17 cases, 14 deaths; Samar Province, 9 cases, 4 deaths.

Plague

Argentina—San Luis Province.—On December 9, 1932, several cases of bubonic plague, one fatal, were reported in the town of Quines, San Luis Province, Argentina.

France—Marseille.—A case of plague was reported December 27, 1932, at Marseille, France.

Hawaii Territory—Plague-infected rats.—Plague-infected rats have been reported at Paauilo, Hamakua Territory, Island of Hawaii, as follows: December 16, 1 rat; December 17, 7 rats; December 25, 1 rat; December 26, 1 rat. Paauilo is in the interior, about 175 miles from Honolulu, which is on the island of Oahu. On December 24 a plague-infected rat was reported from Manienie Gulch, 1 mile from the location where the above-mentioned rats were found.

Yellow Fever

French West Africa—Guinea.—A fatal case of suspected yellow fever was reported December 7, 1932, at Koliagbe, Kindia Circle, Guinea, French West Africa.

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HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst. Surg. Gen. R. C. WILLIAMS, *Chief of Division*

The PUBLIC HEALTH REPORTS are issued weekly by the United States Public Health Service through its Division of Sanitary Reports and Statistics, pursuant to acts of Congress approved February 15, 1893, and August 14, 1912.

They contain: (1) Current information of the prevalence and geographic distribution of preventable diseases in the United States in so far as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other communicable diseases throughout the world. (2) Articles relating to the cause, prevention, or control of disease. (3) Other pertinent information regarding sanitation and the conservation of public health.

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PUBLIC HEALTH REPORTS

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TRENDS OF HEALTH IN THE UNITED STATES[1]

By Rollo H. Britten, *Senior Statistician, United States Public Health Service*

I

In this cursory examination of trends of health in the United States there will be no endeavor to ascertain in what specific instances improvement is due to public health organizations. The progress in many fields is the result of definite scientific advances properly applied. In other cases changes are part and parcel of our altered social existence and, in some instances, of mutations in the natural virulence or invasiveness of the disease itself.

Except for the broadest purposes, little meaning can be derived from mortality rates for the whole population, without regard to age or other factors. The advance in health is customarily measured by such "crude" rates. However, unless some radical changes continue to give us a population abnormally high in the young adult ages (and with the reduction in immigration this seems unlikely), the death rate, unadjusted for age distribution, may be expected to rise, even if there should be improvement in the rate at each specific age.

Most of the material offered is necessarily limited to mortality. Sickness and medical examination data can not reveal the trend of health. For a few of the notifiable diseases, information for the last 15 years will be of value; but even in this group of diseases, inferences as to trend are subject to much error. Yet one of the impressive phenomena of the last 50 years has been the continuous fall in the case fatality of many diseases. Thus a rather untrue impression is obtained from death rates.

A great deal of difficulty will arise from increasing accuracy of diagnosis and incompleteness of birth registration. Especially in the case of cancer and the degenerative diseases, the steady improvement in diagnosis has been so great as to make it almost impossible to determine what the true trends are.

The graphical material must be taken as illustration rather than as evidence. Each individual phase deserves an exhaustive presenta-

[1] Read before session on public health, annual meeting of American Statistical Association, Washington, D. C., Dec. 28, 1931.

tion; but that is not possible in a broad survey; and, as a matter of fact, no such detailed history of the public health in this country, based on objective social phenomena, has ever been carried out.

The rapid growth of the population of the United States needs to be recalled. At the date of the first census, 1790, there were only 5 cities with populations of more than 8,000. Now, there are 8 with populations of more than 800,000. This phenomenal expansion has a momentous bearing on the sanitary history of this country, because of increasing urbanization, changes in racial make-up, development of industry, and other factors.

One of the fundamental changes in the characteristics of the population has been that of its age distribution, reflecting both new levels of health and the influence of immigration. Between 1850 and the present time the percentage of persons 50 years of age and over has nearly doubled.

II

Requisite documents are not available for a complete history of mortality in this country from pre-Revolutionary days, especially in the case of pioneer populations and the more remote districts. It is to be recalled that registration of deaths in this country has lagged behind that in other leading nations. No national statistics of mortality were collected before 1860, and then only at 10-year intervals by census enumerators, such records being palpably incomplete. In 1880 the registration area was established, but included only Massachusetts, New Jersey, and a few cities. The area became a reality only in 1900, and even then was confined to the eastern and central sections of the country. Mortality records back of this period must be procured from individual cities, and are therefore quite unrepresentative of a country which was then primarily agricultural. Even these are of no great help before the nineteenth century.

Such fragmentary information as is available suggests appallingly high mortality rates in the seventeenth century among colonists. Of 7,500 arriving in Virginia between 1618 and 1625, only about 1,000 were alive at the end of the period (1), giving an annual mortality rate far in excess of 500 per 1,000, a large part of which was due to warfare and starvation.

For most of the eighteenth century we have records by keepers of burying grounds in Boston. They are regarded as quite complete, and indicate an average annual mortality of about 70 per 1,000 population among colored slaves and of 33 among the white population (2). There were wide fluctuations in the rates. During the Revolution—in fact, until 1811—no further records are available for Boston; but in the early nineteenth century the rates had fallen to a

much lower level—21 per 1,000 for the total population during the period 1811–1820.

To illustrate the order of magnitude of mortality in this country in the nineteenth century, curves are given in Figure 1 for Chicago (3)

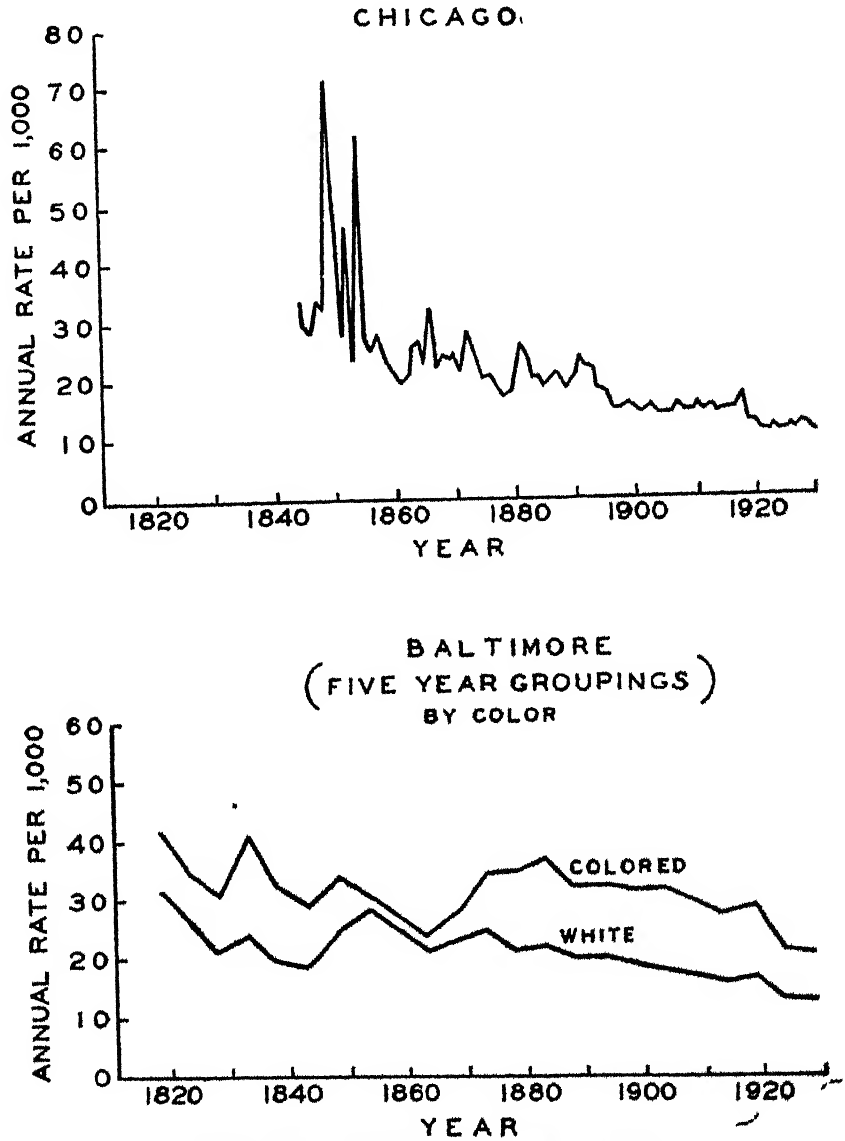


FIGURE 1.—Trend of mortality from all causes in two cities

and Baltimore (4), the latter in 5-year periods. From about 1875 or earlier the rates in the large cities of the United States begin to exhibit a definite downward trend.

One is curious to know whether this downward course was evinced at each age. Retaining Baltimore as an illustration, there is given in Figure 2 the specific mortality rates for some representative ages on semilogarithmic paper (1). Up to 1880 there was no great change in the level of mortality at any age. After that the rate among

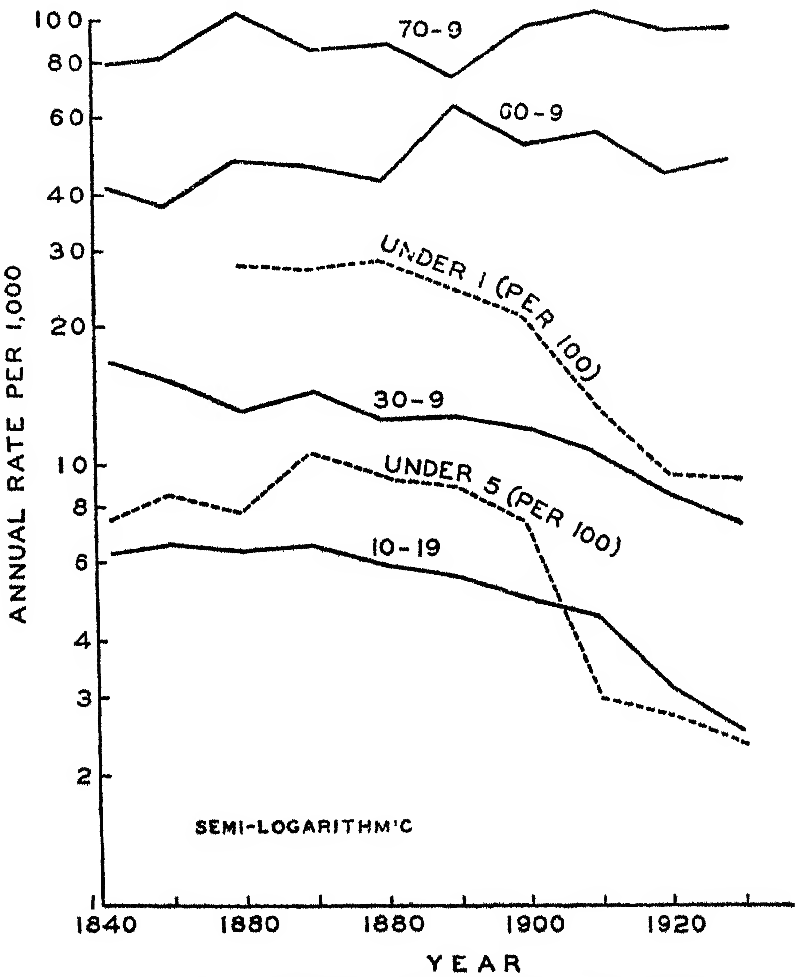


FIGURE 2—Trend of mortality from all causes in Baltimore, in certain age groups

children and young adults has shown a continuous decrease, whereas that of older ages has remained about the same. This illustrates what will be found to have occurred in large cities generally.

Changes in States as a whole can be adequately represented only for recent years. In order to avoid the factors involved in an expanding registration area, the comparisons (Fig. 3) are confined to the 10 States which were in the area in 1900, those being the New England

States, together with New York, New Jersey, Michigan, Indiana, and the District of Columbia (5). As the purpose is one of illustration merely, only 1900 and 1929 are used; but these two years depict changes which have been in uninterrupted progress during the period. States added to the registration area at later dates also manifest similar tendencies.

It is apparent that in the past 30 years there has been a very great decline in the rate of mortality up to about 50 years of age, with no reduction in the highest ages. A comparison of 1920 with 1929

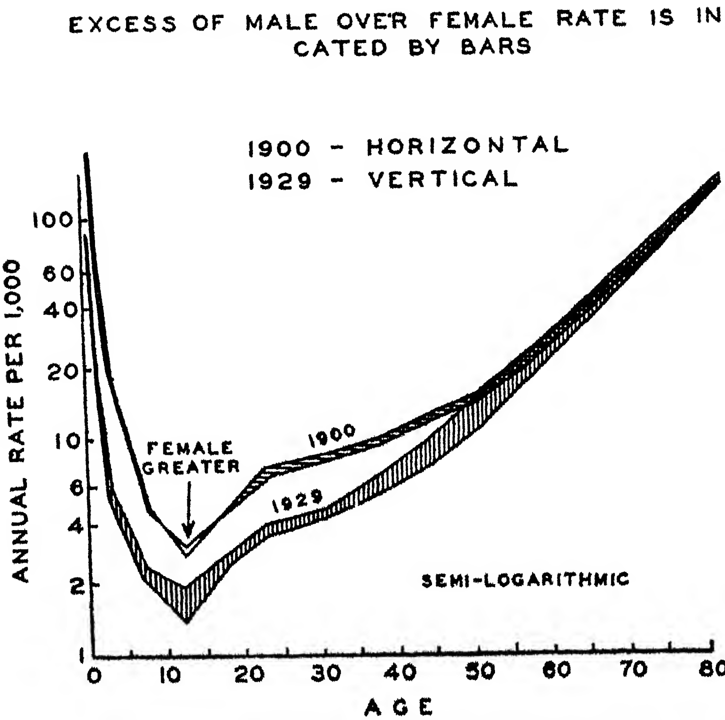


FIGURE 1.—Mortality from all causes by age and sex in original death registration States

indicates that the same tendencies have persisted in the last decade. One significant trend has been the greater improvement in recent years in the mortality among females. The mortality rates are definitely lower among females at each age at the present time, even during the period of childbearing. This was not true in 1900. It is evident that an astonishing change has taken place in the ages between 10 and 20 years- ages at which the male rates tended to be lower than the female in 1900.

Much thought has been given to the favorable mortality showing during the present period of depression. Owing to observed higher mortality in lower wage classes, a rise in mortality might be antici-

pated at the present time. However, previous history in this country will not bear out any such expectation. The major depression cycles in the past fifty years (1875–79, 1884–86, 1894–98, 1914–15) have tended to show general subnormal mortality rates (6). The fact that the present phenomenon is by no means unique, suggests that there may, at the end, be an upward turn in mortality requiring increased vigilance on the part of public health organizations.

No satisfactory comparison over a long period of years can be made for sickness or general physical condition, but it is necessary to remember at each point of discourse that mortality is not an adequate index of real health.

The rates for mortality under 1 year of age employed so far are based upon the enumerated population, which is notoriously uncertain at this period of life. A more satisfactory measure is the relation between the infant deaths and the births. In the United States this index can be employed only since the establishment of the birth registration area in 1915, because previous to that year births were not adequately reported. There has been a continuous decrease in infant mortality since that time, the level of the rates changing from about 100 per 1,000 live births to about 60.

III

The most conspicuous phenomenon in the history of public health in this country has been the reduction in the mortality from acute communicable disease. This tendency is not constant throughout the period of our study, nor in all parts of the country. Among the colonists in Virginia in the seventeenth century, mortality was extremely high from intestinal diseases, winter epidemics which may have been influenza, beri-beri, scurvy, and later, smallpox; but the group of common acute communicable diseases, such as measles, scarlet fever, and diphtheria, do not seem to have been mentioned in the historical records (1). In the eighteenth century, smallpox was extremely prevalent in this country. For instance, in 1721 in Boston alone there were 850 deaths recorded from this cause, giving an annual mortality rate of nearly 8,000 per 100,000 (2). At least five other severe epidemics of smallpox occurred during the century. However, records do not show inordinate mortality from scarlet fever, diphtheria, or measles. But in the nineteenth century mortality from these conditions increased to unprecedented altitudes. In Chicago diphtheria reached a height of 290 deaths per 100,000 in 1880 and scarlet fever of 270 in 1859 (3). In the Middle West and in the South there was a mortality rate from malaria far beyond anything which we can imagine to-day, accustomed as we are to the ravages of this disease. In fact, "sickness" and "malaria" were nearly synonymous. In Chicago in 1854 the mortality rate from "malaria"

was 105 per 100,000. Yellow fever and cholera are two diseases from which there were outbreaks in certain parts of the country, especially along the coasts.

The order in which the most common of these diseases declined to constant low levels is of interest. No annual rates in Chicago have been more than 10 per 100,000 since 1891 for malaria, since 1895 for smallpox, since 1907 for whooping cough, since 1913 for typhoid fever and measles, since 1919 for scarlet fever, and since 1923 for diphtheria.

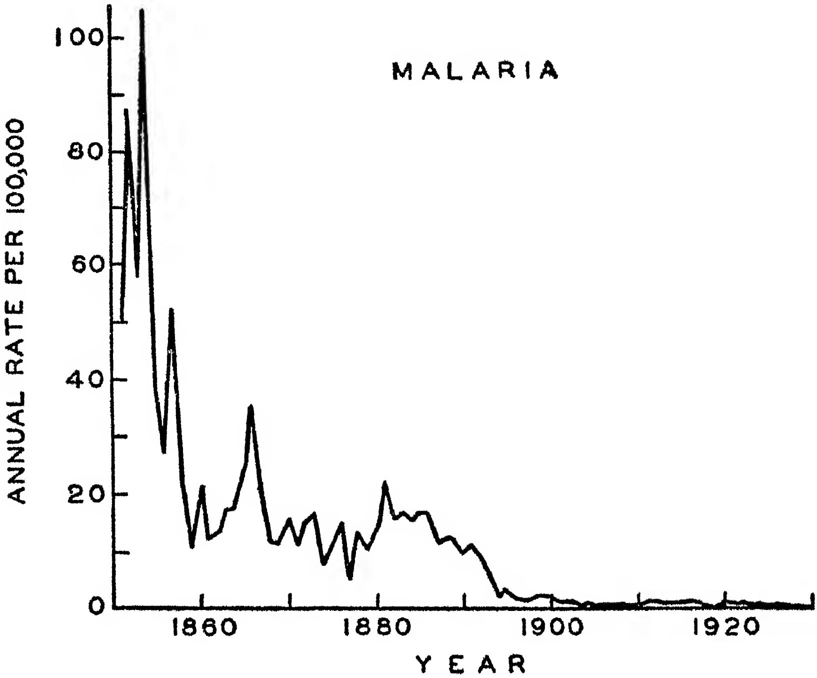
Without reproducing curves for the mortality from all these diseases, it is desired to call attention to the vast epidemic waves that characterized their course, the rapidity of the decline once it set in, and the relatively low levels at the present time. Curves for malaria and smallpox are given in Figure 4, as examples of two diseases where both incidence and mortality in an urban area have fallen in extraordinary degree (3).

The trend of mortality from different causes in recent years can be exhibited for large sections of the United States. Figure 5 gives the rates for the original registration States for 1900, 1910, 1920, and 1929 for two of these diseases (diphtheria and typhoid fever) (5). The recession in mortality is literally phenomenal in each age, even in this limited period of 30 years.

With respect to the incidence of these diseases our material must be confined to the recent past, but it will be sufficient to show that, in some, incidence has fallen with mortality, while in others, the disease itself seems to be nearly as prevalent as before. In the first group may be placed typhoid fever, diphtheria (in the last few years), and malaria (in many sections of the country). In the second group may be placed scarlet fever, measles, and smallpox.

The graphs for diphtheria and typhoid fever (Fig. 6), showing the trend of reported cases since 1912 in three eastern cities (7), serve as an illustration. Other cities with adequate reporting mechanism have similar tendencies. Although an increase in the incidence rate over a period of time might mean better reporting, it is manifest that a decrease is more likely to mean a real reduction in the prevalence of the disease.

I have not shown the course of case fatality rates themselves, but one of the important indications is the reduced fatality of a number of these diseases. This must be particularly true in the case of scarlet fever. If the present fatality rate of about 2 per cent had been true in Chicago in 1859, with a mortality rate of 270, one seventh of the population would have had the disease during the year—which is not possible, when the age incidence of scarlet fever and the possible number of susceptibles are considered. Reduced virulence of many



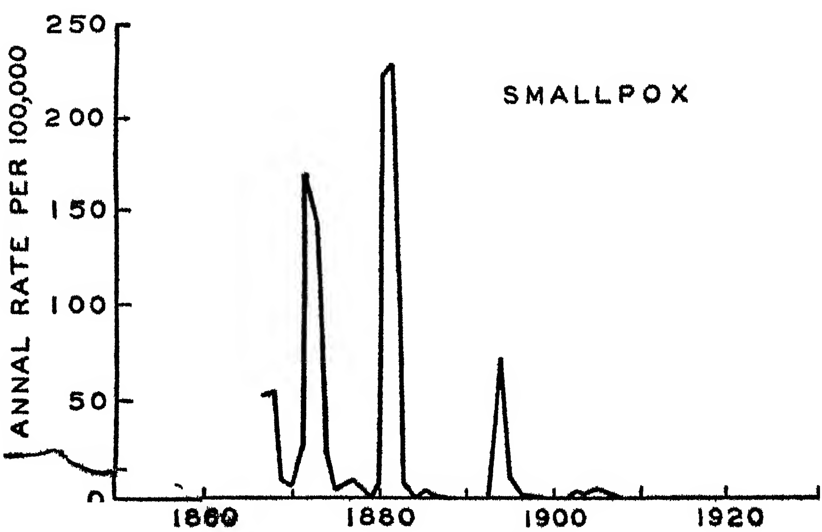
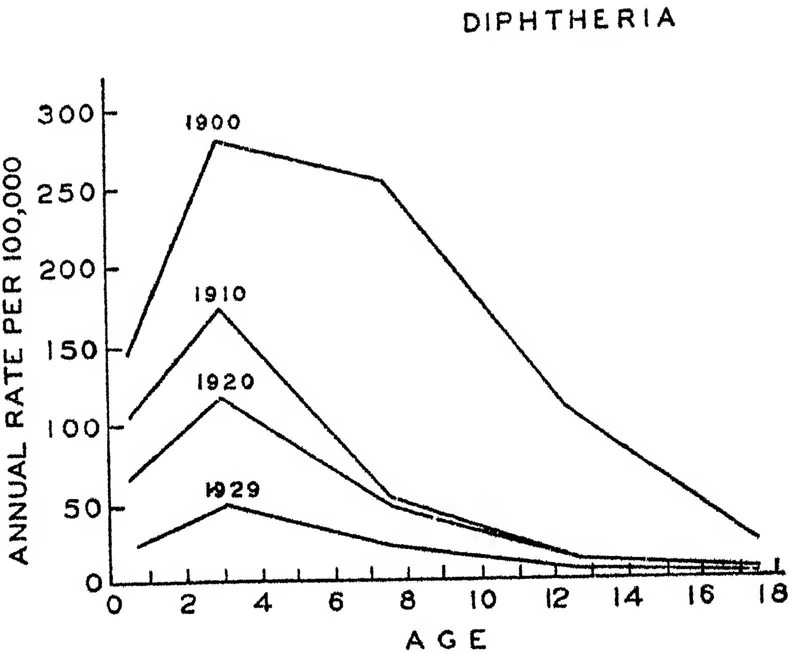


FIGURE 4.—Trend of mortality in Chicago from two specified causes



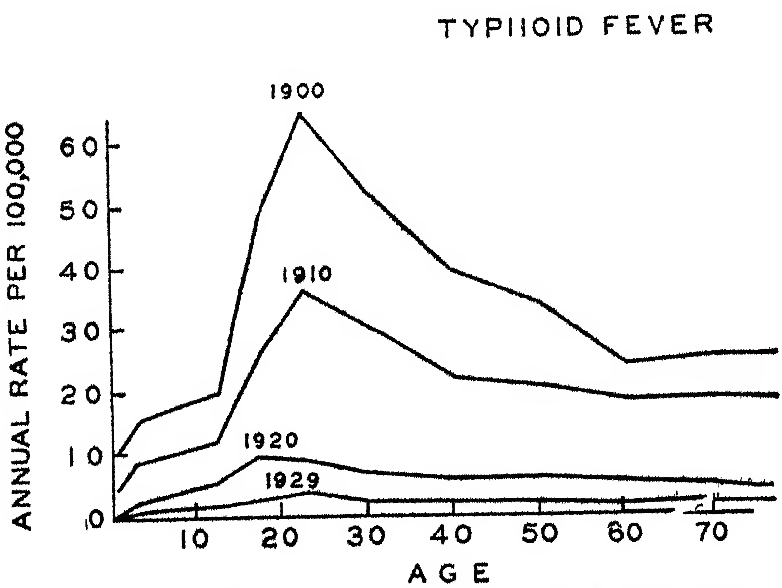
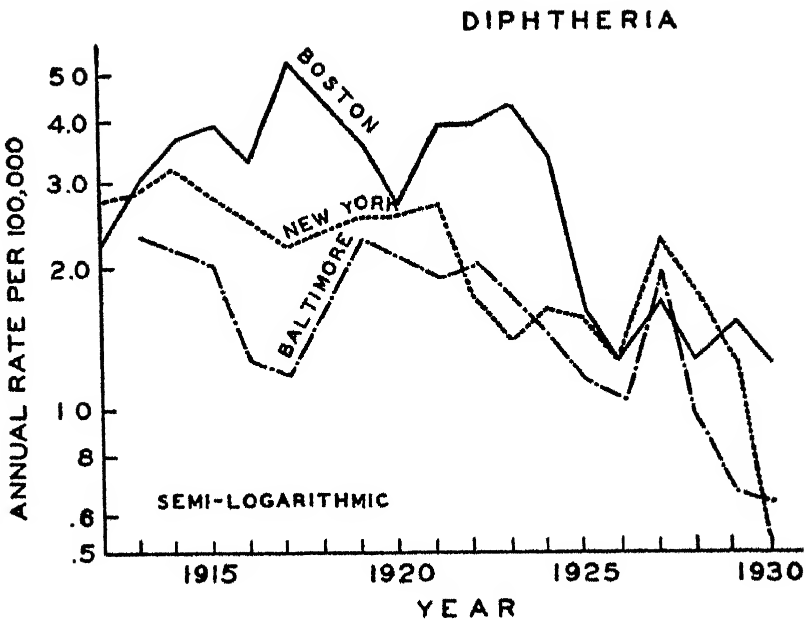


FIGURE 5 —Mortality by age (males) from two causes in original registration States, 1900 1910, 1920, and 1929



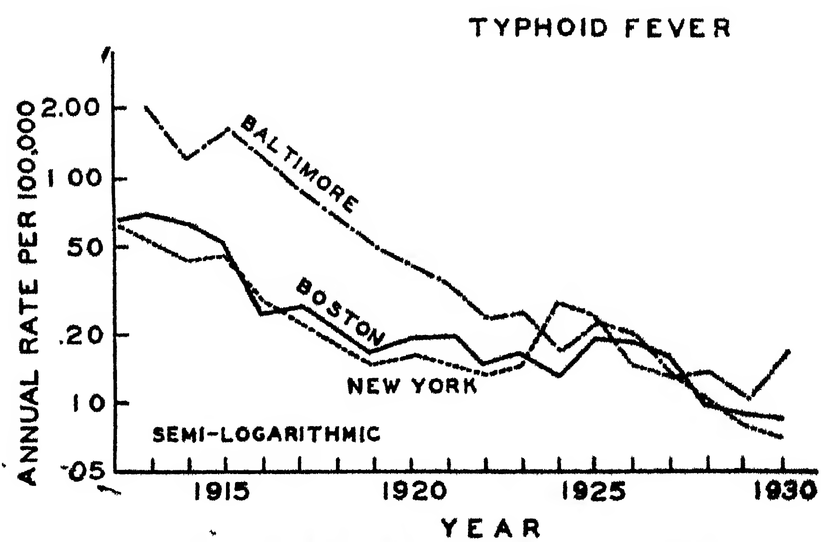


FIGURE 6.—Trend of reported incidence for two causes in three eastern cities

communicable diseases is one of the world-wide tendencies of the present epoch.

Influenza occurs in vast, uncontrolled waves, of which we have, in other countries, rather definite information back into the seventeenth century. During the period of detailed statistics in the United States

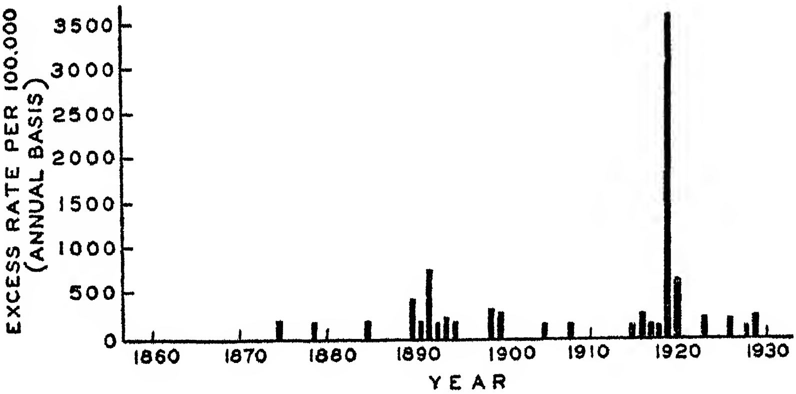
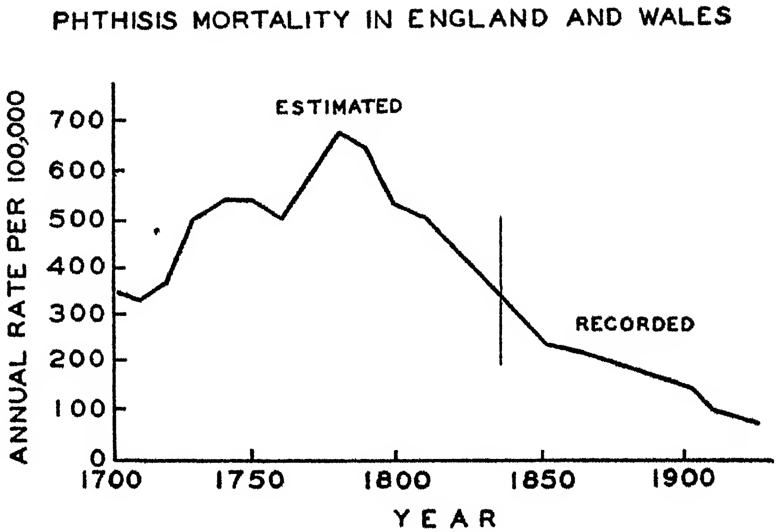


FIGURE 7. Excess mortality from influenza-pneumonia in Massachusetts, 1857–1930: monthly maximum in each year (July–June) if 100 or more.

there have been two major epidemics, one in 1889–1893 and another in 1918–1920. Figure 7 presents a picture of the course of mortality from influenza-pneumonia in Massachusetts since 1857 (8). From the annual rates for each month was subtracted the normal seasonal curve, and in this graph is given the maximum excess monthly rate in various years (July–June), leaving out cases in which this maximum excess did not reach 100 or more deaths per 100,000, such deviations being regarded as possibly a matter of chance.

Available data for the latter part of the nineteenth century do not indicate any great change in the risk of mortality from childbearing; but the material is quite unsatisfactory, because the true risk can be expressed only in terms of births and the births were not adequately registered. In the last 15 years there has apparently been little change in the level of mortality from puerperal septicemia and other puerperal causes, when related to the number of births. However, it is felt that the mortality from puerperal septicemia is much less than in the period prior to the discovery of its infectious nature.

One of the outstanding facts in our medical history is the decrease in mortality from tuberculosis. This is a world-wide phenomenon, like so many which we have discussed, and has been in progress, one suspects, for at least a century. The curve at the top of Figure 8 gives the trend of the mortality from this disease in England and Wales since 1700. Up to 1838 the proportion due to phthisis in London is applied to the whole country (9). By the end of the eighteenth cen-



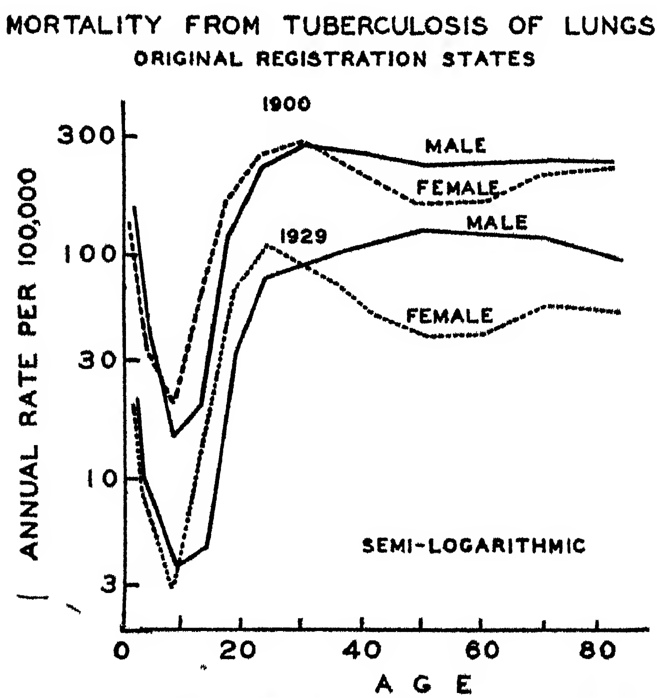


FIGURE 8.—Phthisis mortality in England and Wales and mortality from tuberculosis of lungs, original registration States

tury the rate appears to have reached the unexampled level of about 700 per 100,000; since then it has shown a continuous decline.

The decrease in this country, as shown by available records, has been similar, and has occurred in all groups of the population, even among

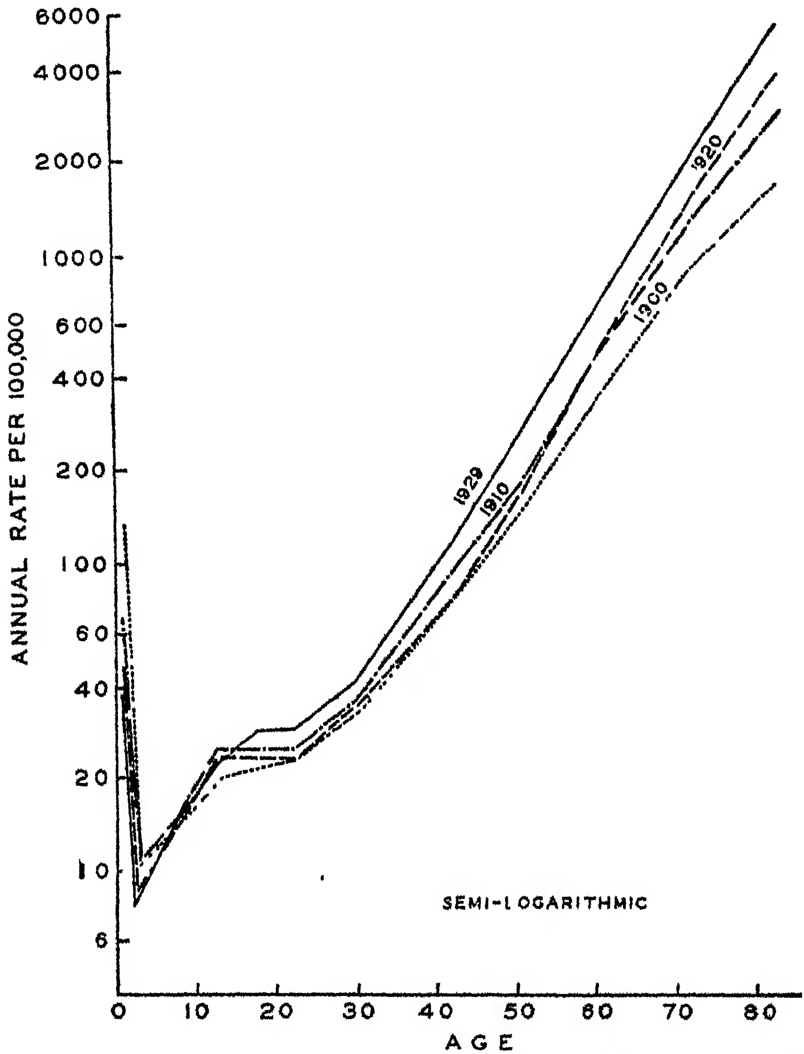


FIGURE 9.—Mortality from "organic" heart diseases in original registration States by age, 1900, 1910, 1920 and 1929

the colored, where the mortality has been so excessive. Perhaps of greatest interest at this moment are the tendencies to be noted at different ages in the two sexes. In Figure 8 (bottom) the age cur of mortality by sex in 1900 is given, as compared with 1929, for original registration States (5). One is struck by the continua

the decrease in the mortality rate, the change at each age being about proportional, and by the accentuation of the differences between the two sexes.

With the lessening in the rate of mortality in the younger portions of our population, attention is more and more focused upon those diseases associated with the breakdown of the bodily organs. The general trend of these diseases is regarded as being upward, even when the age factor is taken into account. Over any long period of time it is difficult to judge this point for specific diseases. What we do know is the picture already presented: Little change in mortality among the older ages in the last 50 to 75 years, and possibly some increase. Actually, however, improvement in diagnosis in this class of diseases is a factor of undecipherable extent. In the thought that after 1900 the effect of this improvement in diagnosis may be less pronounced than previously, attention is centered on the last 30 years.

Organic diseases of the heart form a group of vital interest. Because of changes in classification, it seems preferable to consider this category as a whole. Figure 9 portrays the mortality by age for the original registration States for 1900, 1910, 1920, and 1929 (5). These years serve for illustrative purposes, but probably both 1920 and 1929 are a little too high because of influenza epidemics. The graph suggests that there has been a marked decrease among young persons. The constant rise in the adult population, becoming more and more marked as the older ages are reached, may or may not be real.

The mortality rates from cancer for specific ages continue to rise; the rates for the age group 45–54 in the four years we are considering were 139, 168, 174, and 186. Part of the increase is a matter of improved diagnosis. Is all of it? Whatever the trend in specific ages, it is evident that cancer is forming a greater and greater problem in public health because of the large proportion of people reaching ages at which it is prevalent.

Automobile accidents do not appropriately come under this discussion, but the unwonted increase in this form of death makes a reference to it desirable. Generally speaking, the rise in the rate appears to be roughly proportional to the increased use of automobiles. The rate is now more than 25 per 100,000.

One of the visible modifications associated with the mortality trends which have been discussed is a shift in the seasonal distribution of disease. Formerly mortality was greatest in the summer; now it is greatest in the winter. In Figure 10 two periods are contrasted to make this point clear (10).

There are many conditions, such as the common cold, that can form no part of this history because of the impossibility of determining the trend. Others have necessarily been omitted for lack of space. In most of the comparisons it has also been necessary, because of the broadness of the historical sketch, to consider the population as a

whole. It would be interesting, however, to trace the course of health more adequately in certain groups of the population; for instance, among industrial workers.

A review of this character should really be concerned with positive health, something which is being measured to-day in a degree through

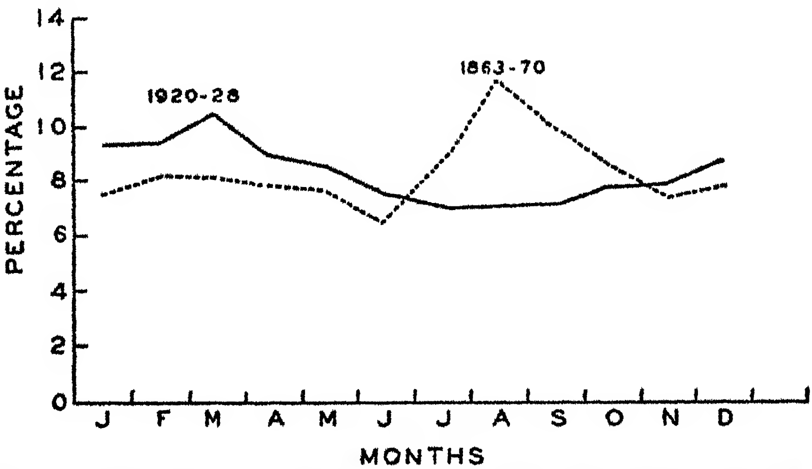


FIGURE 10. Seasonal distribution of deaths from all causes in Massachusetts, 1863-1870, and 1920-1928

our sickness surveys and our medical examinations. But no comparison with the past in this regard has the slightest meaning, because no data exist for previous periods, and because, even if they did, there would probably be no basis of comparability.

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(10) Calculated from reports of State Registrar and from data furnished by Vital Statistics Division, Bureau of Census. Percentage distribution of the *median* number of deaths in any one calendar month for the two periods.

THE INFLUENCE OF OXYGEN TENSION ON THE RATE OF AUTOLYSIS OF CERTAIN MALIGNANT TUMORS AND NORMAL TISSUES

By Mary E. Maver, *Biochemist*, J. M. Johnson, *Senior Chemist*, and Carl Voegtlin, *Chief of the Division of Pharmacology, National Institute of Health, United States Public Health Service*

In a recent paper Voegtlin and Maver (1932) have shown that the oxygen tension is a controlling factor in the autolysis of two typical transplantable neoplasms of the rat. Evidence was also presented indicating that molecular oxygen in the presence of naturally occurring catalysts (copper) has a tendency to oxidize the SH group of glutathione and tissue proteins. The work of Grassmann, v. Schoenebeck, and Eibeler (1931), and of Waldschmidt-Leitz, Purr, and Balls (1930) has demonstrated that reduced glutathione "activates"[1] certain plant and animal proteases, when digestion is carried out under ordinary conditions. Therefore, Voegtlin and Maver attribute the increased autolysis which they observed under conditions of greatly reduced oxygen tension to the slower rate of oxidation of the "activating" SH groups. This viewpoint received further support from experiments dealing with the proteolytic action of papain on substrates containing protein sulphydryl groups (PSH) or substrates free from SH but supplemented by the addition of reduced glutathione (GSH). All of this work dealt with the determination of the degree of proteolysis after a period of about 22 hours' digestion (pH-activity curves). It was stated in the first paper that experiments dealing with the *rate* of proteolysis would be reported at an early date. The purpose of the present communication is to describe this additional evidence. The experiments were carried out with the same two tumor strains and the same papain systems as used in the previous work. It seemed desirable to include also data on a few normal tissues for comparison with the cancer tissues.

EXPERIMENTAL PART

The technic of the preparation of the digestion mixtures and the pH buffers was the same as described by Voegtlin and Maver (1932). It was considered desirable to supplement the Sörensen amino nitrogen titrations by estimations of the remaining undigested protein. For this purpose the digests were treated with trichloracetic acid so as to obtain a final concentration of 16 per cent trichloracetic acid. The suspension was filtered until a clear filtrate was obtained. Aliquots of the filtrate were analyzed for total nitrogen according to Koch and McMeekin (1924). This method yields information as to

[1] The term "activation" merely means that the presence of certain SH compounds promotes proteolysis. The mechanism responsible for this increased proteolysis by SH compounds is not satisfactorily explained. It appears to have some relation to the inhibiting action on proteolysis exerted by certain heavy metals.

the rate of disappearance of coagulable protein due to the action of proteinases upon the proteins of tissues.

The data in the first paper concerning the relation of SH compounds to proteolysis were based on qualitative tests by means of the delicate nitroprusside test for the presence or absence of SH. The only quantitative estimations of SH were made on the system papain-fibrin-reduced glutathione. It was obvious, therefore, that quantitative methods were needed in order to establish more forcibly this relationship between SH groups and proteolysis. Present knowledge indicates that the SH groups in tissues are attached to glutathione and certain tissue proteins. Cysteine apparently occurs only in traces. In a paper, which will soon appear, Johnson and Voegtlin [2] will report on experiments in which they have submitted the various methods for the quantitative estimation of GSH in tissues to a critical test and have arrived at the conclusion that the iodometric titration, using nitroprusside as an end-point indicator, yields reliable results. As regards the estimation of protein SH (PSH), no suitable methods which could be applied to the present problem have yet been devised. Mirsky and Anson (1930) have attempted to estimate the SH groups in denatured proteins. Their paper has appeared so far only in abstract form. In a paper from this laboratory, Rosenthal (1932) has shown by quantitative experiments that PSH reacts with arsenious oxides to form very firm combinations. However, this technic is hardly suited for the large number of estimations required in studies on proteolysis. Two of the present authors (Voegtlin and Johnson), therefore, have worked out a method which permits the estimation of the total SH concentration (GSH + PSH) in tissue extracts. This method, an account of which will be published in the near future, is based on the iodometric titration in an acid medium, using nitroprusside as end-point indicator. The results obtained with this method are not quite as reliable as those obtained in the GSH titration, but they are sufficiently reliable for comparative experiments. More detailed information could undoubtedly be secured by the application of the new method for total SH concentration and a separate estimation of GSH. However, in view of the fact, established by Voegtlin and Maver (1932), that both GSH and PSH appear to be "activators" of certain tissue proteases, the present studies were made by applying the estimation of total SH to the digests.

In order to reduce the O_2 tension during the digestion period, the digestion mixtures were placed in Thunberg tubes and the air was removed by an efficient vacuum pump (Cenco type). The actual O_2 tension of these digests before and after incubation was not measured, as the purpose of the work was merely to show whether or not the *rate* of proteolysis was markedly influenced by a great reduction in O_2

[2] This paper will appear elsewhere.

tension For comparison, samples of the same digestion mixtures were exposed to atmospheric air in small Erlenmeyer flasks provided with cork stoppers. The tissues were obtained in the morning of the day of the experiment by decapitating and exsanguinating the animals. In the case of the liver it seemed advisable to remove the remaining blood as far as possible. This was done by short perfusion through the portal vein with a Ringer solution containing 9 g NaCl, 0.42 g KCl, and 0.24 g $CaCl_2$ per liter. The skeletal muscle and tumors contained only small amounts of residual blood. We are indebted to Dr. J. W. Thompson, of the National Institute of Health, for a supply of rats carrying the Jensen sarcoma and the Walker carcinoma No. 256. Tumors were selected which showed only a moderate degree of central necrosis. The necrotic portion and capsule were discarded. The preparation of the digestion mixtures, after the death of the animal, was done as expediently as possible, and required one to two hours before digestion at 37° C. was begun Toluene was used to prevent bacterial growth Samples of digests were removed after 2, 4, and sometimes 8 hours, and on the next morning (about 22 hours). Separate formol titrations, according to Sorensen, were made on duplicate samples; duplicates were also used for coagulable protein and for total SH concentration. Similar estimations were made, of course, on samples immediately before digestion was begun. In the charts illustrating some of the experiments which were performed the increase in amino nitrogen is always expressed as the difference between the undigested control samples and the digested samples, in terms of number of c c N/20 NaOH. The decrease in coagulable protein (whole protein) is given in terms of number of milligrams protein nitrogen, the first point on the curves representing the actual amount of protein nitrogen at the beginning of the experiments. The scale for the total SH concentration of the digests, in milligrams, is placed on the right side of the charts.

DISCUSSION OF RESULTS

Charts 1 and 2 illustrate some of the experiments done on the autolysis of the rat carcinoma and sarcoma. The results varied quantitatively from experiment to experiment, but the main features were the same in all experiments. During the first two hours of digestion the total SH concentration remains high under greatly reduced O_2 tension; in fact, there is a tendency for a marked increase of SH concentration. This increase is probably due to the high reduction potential of the tissue extract, which under reduced O_2 tension may reduce part of the sulphur which was oxidized during the preliminary aerobic preparation of the digests. On the other hand, the digests exposed to the atmospheric O_2 tension show a rapid decrease in the total SH concentration during the first two hours, and this

decrease progresses rapidly during the next few hours, reaching zero within eight hours in the experiment illustrated by Chart 2. At the end of the digestion period (22 hours) the digests exposed to the reduced O_2 tension show a much higher SH concentration than those exposed to O_2 at atmospheric pressure. As regards the digestion of protein, the charts show conclusively that the coagulable protein disappears from the digests at a greater rate when the O_2 tension is

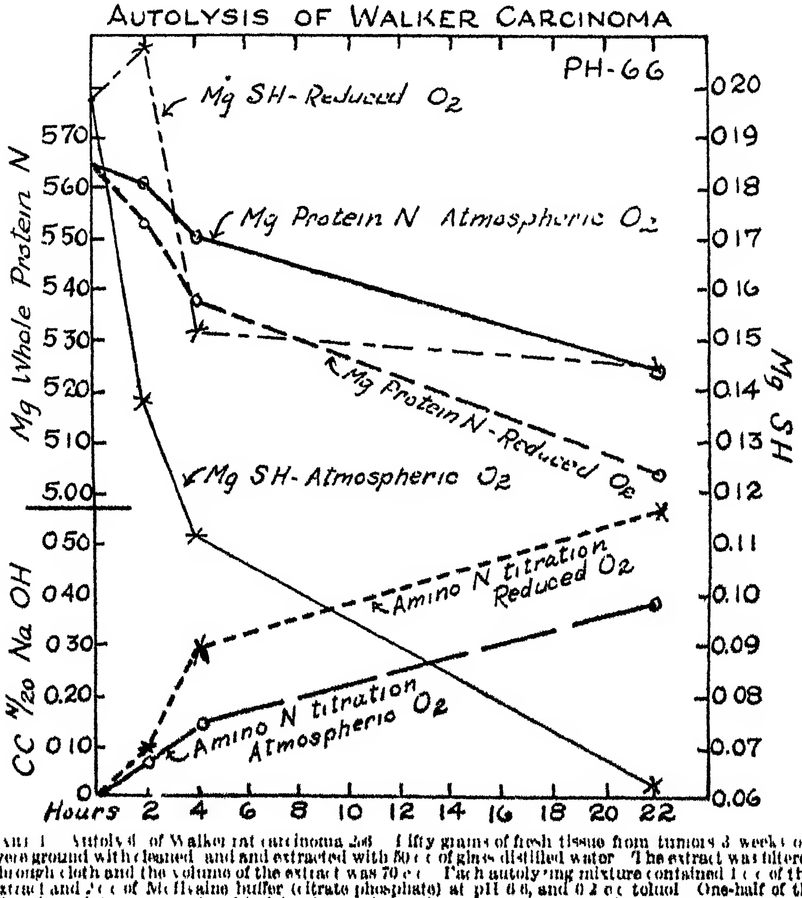

CHART 1. Autolysis of Walker rat carcinoma 256. Fifty grams of fresh tissue from tumors 3 weeks old were ground with cleaned sand and extracted with 50 c.c. of glass distilled water. The extract was filtered through cloth and the volume of the extract was 70 c.c. Each autolyzing mixture contained 1 c.c. of this extract and 2 c.c. of McIlvaine buffer (citrate phosphate) at pH 6.6, and 0.2 c.c. toluol. One-half of the digestion mixtures were placed in Thunberg tubes and evacuated to 7 mm. air pressure over mercury. The remainder were placed in 25 c.c. Erlenmeyer flasks and corked.

greatly reduced below that of atmospheric air. The lower two curves in the charts clearly show that the rate of increase of protein split products during digestion, on the whole, is greater under reduced O_2 tension, particularly during the first four hours. It is well to point out that these experiments were carried out within the pH range characteristic of these tumors in living animals. We may conclude that, under the conditions of these experiments, the rate of proteolysis

is favored by greatly reducing the O_2 tension, and it would seem that this result is consistent with the slower rate of oxidation of SH groups, which apparently promote the action of certain proteolytic enzymes.

Chart 3 illustrates the autolysis of the skeletal muscle of the albino rat when the pH of the digests is adjusted to 6.6. Preliminary estimations of the pH of this tissue in the living animal by means of the glass electrode indicate that the pH of the tissue is considerably on

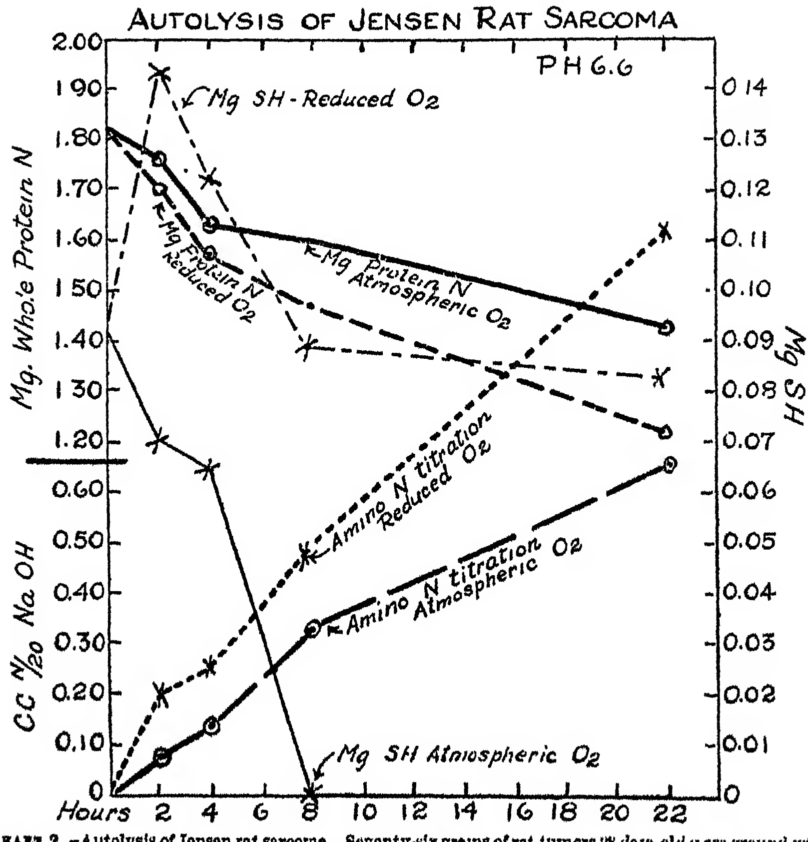

CHART 2. —Autolysis of Jensen rat sarcoma. Seventy-six grams of rat tumors 28 days old were ground with cleaned sand and extracted with 76 c c of glass distilled water. The extract was pressed through cloth. The volume of the filtrate was 100 c c. Each autolyzing mixture contained 1 c c of this extract, 2 c c of McIlvaine buffer at pH 6.6, and 0.2 c c toluol.

the alkaline side of 7. In order to make a comparison of the autolysis of skeletal muscle with that of the previously described experiments on malignant tumors, pH 6.6 was chosen. It will be noted from Chart 3 that the total SH concentration during the first two hours remains unchanged, whether the digestion is carried out at atmospheric or reduced O_2 tension. Digestion of protein, however, proceeds under reduced O_2 tension, but not under atmospheric O_2 tension. During the two to four hour period the SH concentration

under reduced O_2 tension increases, whereas it decreases under atmospheric O_2 tension. Simultaneously, the coagulable protein decreases further under reduced O_2 tension, and there is a slight indication of increase in coagulable protein under atmospheric O_2 tension. In the latter case, at the end of 22 hours the protein is present in almost the same amount as at the beginning of the experiment. The increase

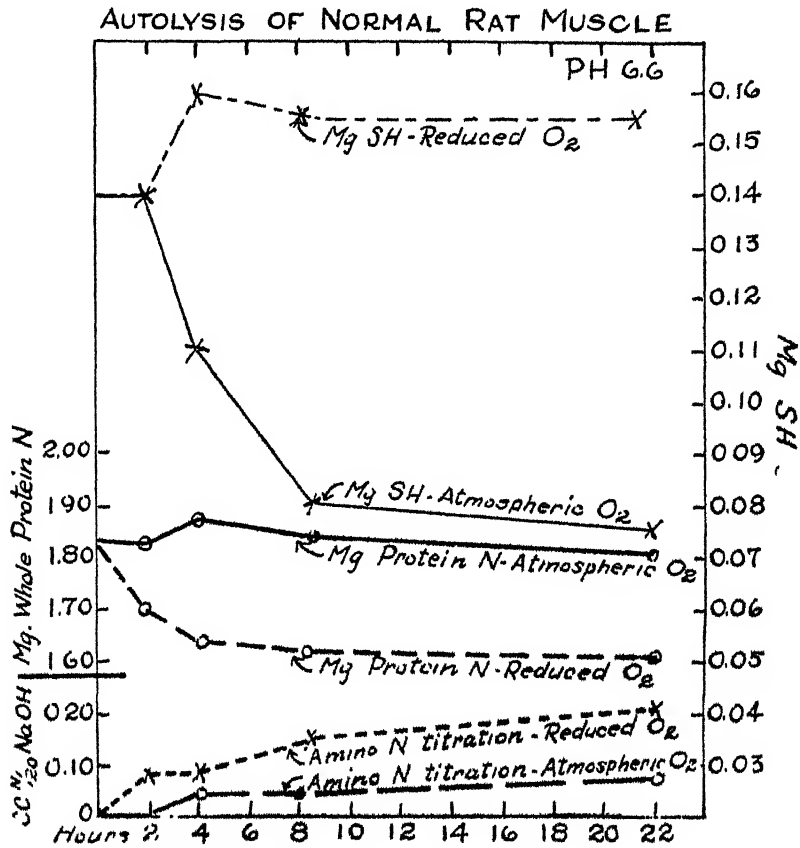

CHART 3. Autolysis of rat skeletal muscle. One hundred and eighteen grams of fresh rat skeletal muscle were ground with sand and extracted with 100 c.c. glass distilled water. The extract was filtered through cloth. The volume of the filtrate was 90 c.c. Each autolyzing mixture contained 1 c.c. of the muscle extract and 2 c.c. of McIlvaine buffer at pH 6.6 and 0.2 c.c. toluol.

of protein split products (lower two curves) again shows a slightly greater rate of digestion under reduced O_2 tension.

The autolysis of rat liver at pH 6.6 and 7.6, respectively, is illustrated by Charts 4 and 5. Here again proteolysis takes place at a greater rate under reduced O_2 tension, and the rate of decrease of SH concentration is less than under atmospheric O_2 tension.

Chart 6 gives the results obtained in the study of a digestion system in which the SH groups are represented exclusively by PSH.

Here, too, the same general relationship holds between rate of proteolysis, O_2 tension, and SH concentration.

The last system studied is the action of papain on blood fibrin in the presence of added GSH. (Chart 7.) The results obtained need no further comment, as they are of the same general nature as those in the preceding systems.

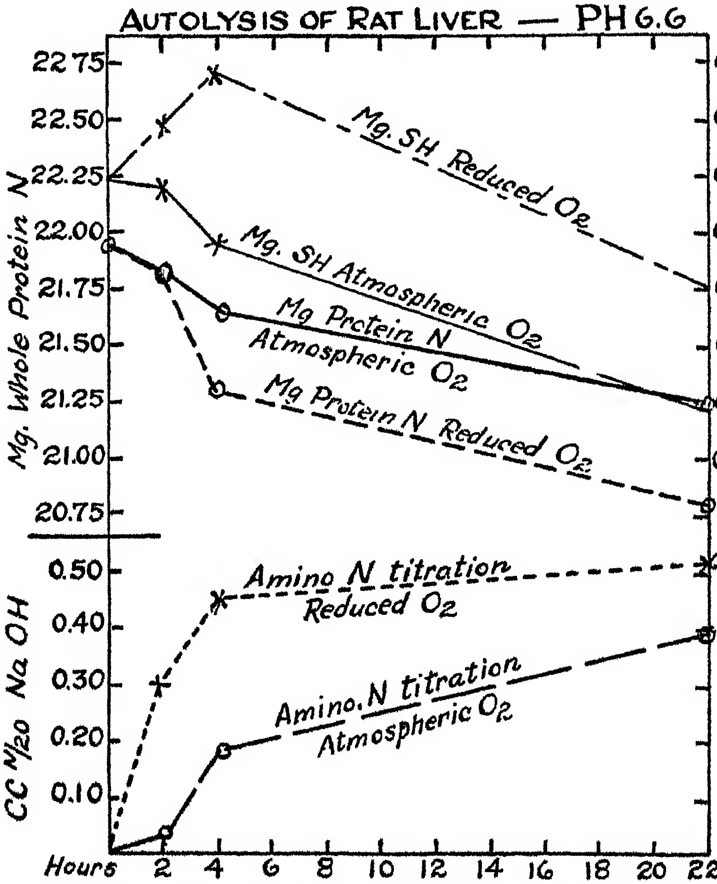

CHART 4.—Autolysis of normal rat liver at pH 6.6. The livers of normal rats were perfused with Ringer's solution containing no sodium bicarbonate or dextrose to wash out as much blood as possible. Sixty three grams of these perfused rat livers were ground with sand and extracted with 90 c c glass-distilled water. The extract was filtered through cloth. The volume of the filtrate was 120 c c. Each autolysis mixture contained 1 c c of this liver extract and 2 c c of McIlvaine buffer at pH 6.6, and 0.2 c c toluol

It will have been noticed that the SH concentration in some of these experiments declined considerably even under the greatly reduced O_2 tension produced by an efficient vacuum pump. It is difficult to decide whether there was a sufficient amount of residual molecular oxygen or possibly a slight leakage of the Thunberg tubes to account for this oxidation or whether the oxidation of SH was

brought about by some easily reducible components of the system. At any rate, it is certain that the method used for reduction of O_2 tension was sufficient to bring out marked differences both in rate of oxidation of SH and rate of proteolysis.

In these experiments only a few time intervals were used for estimating the rate of change. In work which is in progress a more

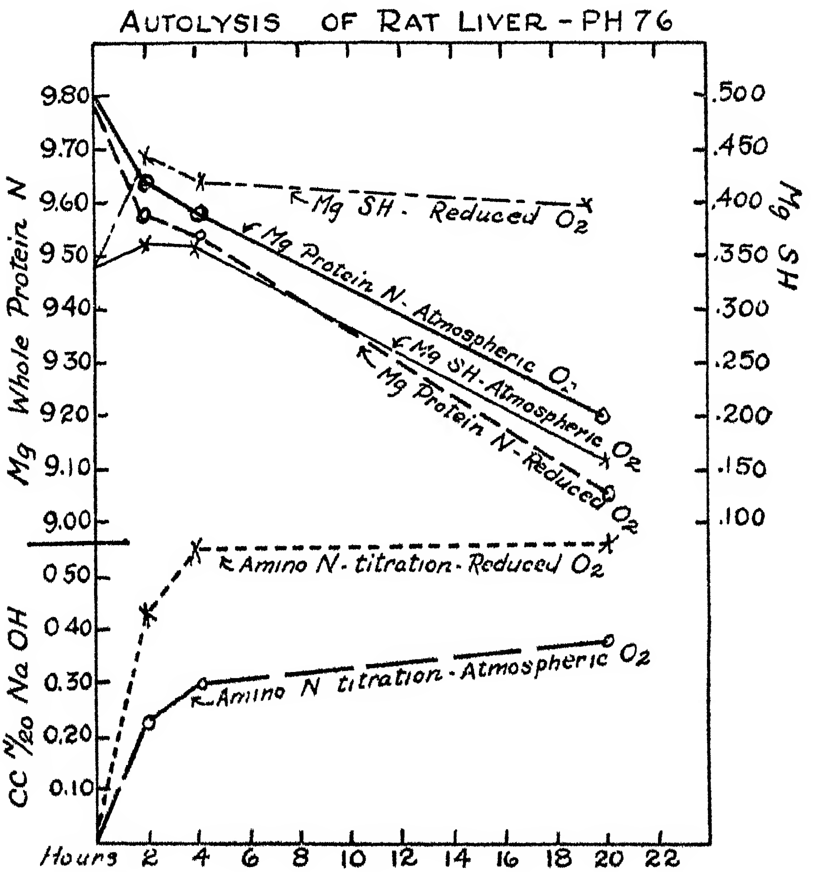

CHART 5. Autolysis of rat liver at pH 7.6. Fifty-two grams of perfused rat liver were ground with sand and extracted with 75 c.c. glass distilled water. The extract was filtered through cloth. The volume of the filtrate was 100 c.c. Each autolyzing mixture contained 1 c.c. of this liver extract and 2 c.c. of McIlvaine buffer at pH 7.6, and 0.2 c.c. toluol.

detailed study is made of the changes taking place during the first few hours of digestion.

SUMMARY

The oxygen tension exerts a marked influence on the rate of autolysis of two malignant neoplasms, the skeletal muscle and the liver of the albino rat. Under greatly reduced oxygen tension the rate of

proteolysis is increased and the rate of oxidation of SH groups is lowered, as compared with digestion under atmospheric oxygen tension.

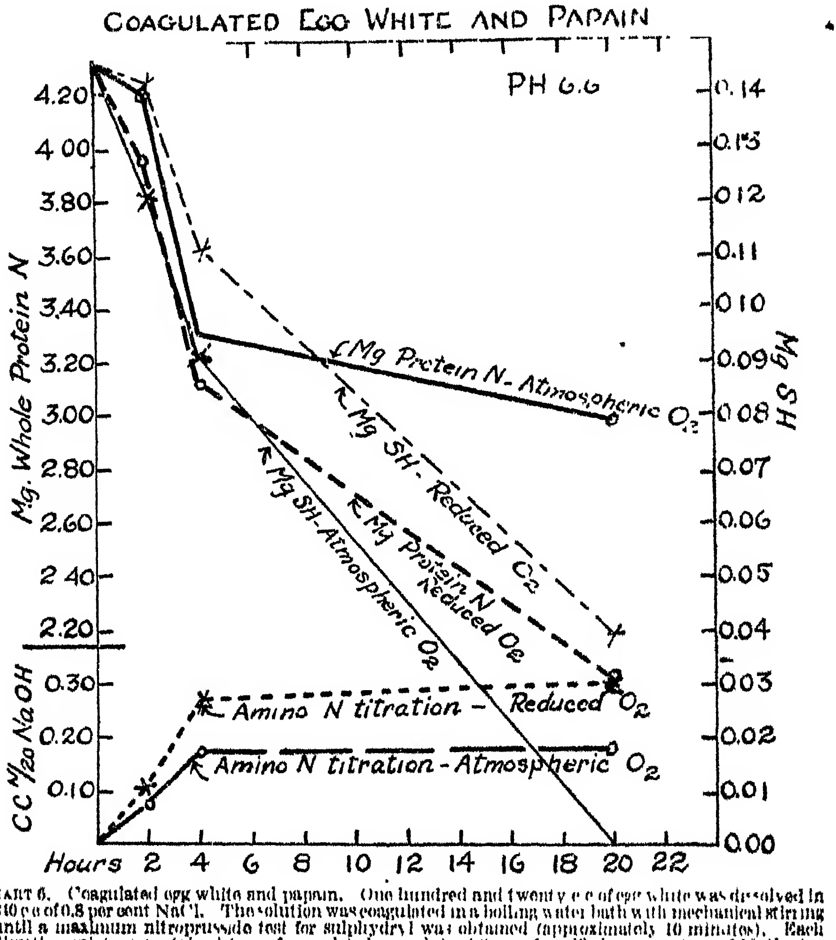

CHART 6. Coagulated egg white and papain. One hundred and twenty c c of egg white was dissolved in 240 c c of 0.8 per cent NaCl. The solution was coagulated in a boiling water bath with mechanical stirring until a maximum nitroprusside test for sulphydryl was obtained (approximately 10 minutes). Each digestion mixture contained 1 c c of coagulated egg white, 4.8 mg of purified papain, 2 c c of McIlvaine buffer to maintain a pH of 6.6, and 0.2 c c toluol.

The same relationships are found in the digestion of coagulated egg white by papain and the digestion of blood fibrin by papain in the presence of reduced glutathione.

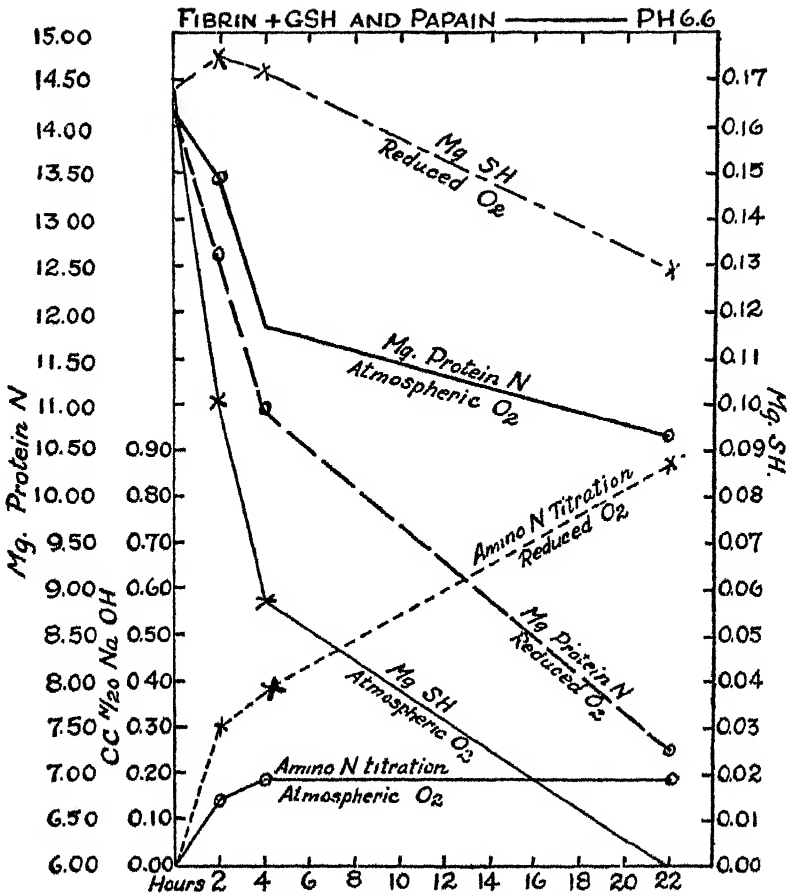

CHART 7.—The action of papain on fibrin in the presence of reduced glutathione. These digestion mixtures contained 1 c c of a 10 per cent ball mill emulsion of blood fibrin (Merck), 4 8 mg of papain and 1 5 mg of GSH, 2 c c of McIlvaine buffer at 7.3 - which gave the mixture a pH of 6.6 and 0.2 c c toluol.

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COURT DECISION RELATING TO PUBLIC HEALTH

Statute requiring notice to be given regarding use of liquid, frozen, and dried eggs and other egg products imported from foreign countries held constitutional.—(California Supreme Court; Ex parte Bear, 15 P. (2d) 489; decided Oct. 21, 1932.) The title of chapter 280 of the 1931 California Statutes read as follows:

An act to provide for the inspection and certification of liquid eggs, frozen eggs, and dried eggs, and any other egg products produced in the State of California and within the United States and imported into the State of California from without the United States for the purpose of human consumption; to prescribe certain powers and duties of the State department of public health with respect thereto and to provide penalties for violations of the provisions of this act.

One provision in the law required restaurants, hotels, cafés, bakeries, and confectioneries using egg products imported from without the United States to display a sign to that effect, while another required manufacturers of food products using egg products so imported to label each package so as to show such use.

The petitioner, a food manufacturer, was charged with violating the statute and, in a habeas corpus proceeding, contended that the provisions set out above were unconstitutional. The reasons assigned against this part of the statute were: (1) It interfered with the power of Congress over interstate and foreign commerce; (2) it was an unreasonable and arbitrary exercise of police power; and (3) it was not embraced within the title of the act. The supreme court ruled adversely to the petitioner on all three points, taking the view that the portion of the statute assailed was constitutional and valid.

DEATHS DURING WEEK ENDED DECEMBER 24, 1932

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Dec. 24, 1932	Corresponding week 1931
Data from 86 large cities of the United States:		
Total deaths	9,611	7,383
Deaths per 1,000 population, annual basis	13.7	10.7
Deaths under 1 year of age	691	555
Deaths under 1 year of age per 1,000 estimated live births [1]	56	43
Deaths per 1,000 population, annual basis, first 51 weeks of year	11.2	11.7
Data from industrial insurance companies:		
Policies in force	69,276,593	74,282,027
Number of death claims	13,977	10,920
Death claims per 1,000 policies in force, annual rate	10.5	7.7
Death claims per 1,000 policies, first 51 weeks of year, annual rate	9.5	9.6

[1] 1932, 81 cities; 1931, 77 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended December 31, 1932, and January 2, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended December 31, 1932, and January 2, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Dec. 31, 1932	Week ended Jan. 2, 1932	Week ended Dec. 31, 1932	Week ended Jan. 2, 1932	Week ended Dec. 31, 1932	Week ended Jan. 2, 1932	Week ended Dec. 31, 1932	Week ended Jan. 2, 1932
New England States:								
Maine		6	72	2		375	0	0
New Hampshire		6			1	2	0	0
Vermont	1				1	162	0	0
Massachusetts	20	41	51	11	97	545	1	0
Rhode Island	1	5	48	7	1	606	0	0
Connecticut	6	5	96	2	27	61	0	0
Middle Atlantic States:								
New York	68	121	[illegible]	16	789	646	3	9
New Jersey	21	16	161	14	255	16	3	0
Pennsylvania	108	125			297	941	3	3
East North Central States:								
Ohio	72	150	1,178	40	449	153	1	3
Indiana	68	64	1,899	30	14	64	3	21
Illinois	68	122	363	19	43	36	21	3
Michigan	40	42	167	2	314	69	8	3
Wisconsin	8	15	1,906	15	215	79	1	2
West North Central States:								
Minnesota	3	19	55	3	52	48	1	3
Iowa	12	22	3,438		3	6	1	1
Missouri	30	55	257	3	23	10	4	1
North Dakota	2	0	4,618		26	24	1	0
South Dakota	3	6	199		3	35	0	0
Nebraska	11	6	305	2	6	5	2	0
Kansas	17	45	27,779	2	17	20	1	1
South Atlantic States:								
Delaware	4	8	0	1	2	1	0	0
Maryland [3, 4]	11	40	1,300	42	8	13	1	1
District of Columbia	10	6	74		4	2	1	1
Virginia	28				113		0	
West Virginia	13	29	1,911	15	100	205	0	0
North Carolina [3]	29	73	804	34	85	67	1	3
South Carolina	5	21	2,179	387	35	21	0	0
Georgia [3]	8	11	1,467	58	3		7	0
Florida	14	9	70	3		1	0	0
East South Central States:								
Kentucky	21	53	3,004				0	6
Tennessee	10	52	4,098	49	14	10	3	4
Alabama [3]	24	45	4,424	52		6	0	1
Mississippi	7	23					0	1

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended December 31, 1932, and January 2, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Dec. 31, 1932	Week ended Jan. 2, 1932	Week ended Dec. 31, 1932	Week ended Jan. 2, 1932	Week ended Dec. 31, 1932	Week ended Jan. 2, 1932	Week ended Dec. 31, 1932	Week ended Jan. 2, 1932
West South Central States:								
Arkansas	12	19	10,054	6	--------	1	4	0
Louisiana [3]	17	34	910	4	11	12	2	1
Oklahoma [4]	36	61	2,369	71	3	1	0	0
Texas [3]	70	94	2,794	14	450	--------	0	1
Mountain States:								
Montana	1	1	7,073	--------	256	98	0	0
Idaho	3	1	12	--------	1	--------	1	0
Wyoming	--------	--------	181	--------	11	9	0	0
Colorado	5	4	100	--------	7	1	0	1
New Mexico	24	38	1	--------	2	1	1	1
Arizona	1	6	32	6	1	--------	1	0
Utah [2]	2	--------	44	4	1	--------	0	0
Pacific States:								
Washington	3	5	154	--------	2	187	1	1
Oregon	1	1	2,358	65	15	6	0	1
California	44	63	1,219	161	83	177	5	6
Total	980	1,598	90,102	1,110	3,849	4,642	77	79

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Dec. 31, 1932	Week ended Jan. 2, 1932	Week ended Dec. 31, 1932	Week ended Jan. 2, 1932	Week ended Dec. 31, 1932	Week ended Jan. 2, 1932	Week ended Dec. 31, 1932	Week ended Jan. 2, 1932
New England States:								
Maine	0	2	21	35	0	0	2	3
New Hampshire	0	1	20	10	0	1	0	0
Vermont	0	0	11	12	0	10	0	0
Massachusetts	0	1	353	372	0	0	3	20
Rhode Island	0	0	36	50	0	0	0	0
Connecticut	0	0	110	65	6	2	0	2
Middle Atlantic States:								
New York	6	17	554	582	0	3	2	19
New Jersey	4	0	211	141	0	0	1	2
Pennsylvania	2	2	691	495	0	0	9	16
East North Central States:								
Ohio	1	2	615	505	8	22	6	20
Indiana	0	4	111	81	4	10	0	9
Illinois	2	1	374	287	0	34	9	13
Michigan	1	2	463	251	0	4	16	4
Wisconsin	0	1	65	65	5	8	0	3
West North Central States:								
Minnesota	2	1	83	46	0	9	0	1
Iowa	2	3	42	32	34	47	0	0
Missouri	0	0	71	56	0	19	1	0
North Dakota	0	0	6	18	1	12	0	3
South Dakota	0	1	15	14	0	12	3	2
Nebraska	0	1	36	39	1	5	1	1
Kansas	0	0	87	60	0	1	0	8
South Atlantic States:								
Delaware	0	0	6	17	0	0	1	0
Maryland [2 3]	0	0	94	86	0	0	4	10
District of Columbia	0	0	9	23	0	0	0	1
Virginia	1	--------	66	--------	4	--------	7	--------
West Virginia	0	1	37	22	1	6	1	24
North Carolina [3]	0	0	60	73	1	0	3	4
South Carolina	1	0	12	14	1	2	3	12
Georgia [3]	1	0	12	26	0	1	5	7
Florida	1	0	8	12	0	0	1	1
East South Central States:								
Kentucky	1	0	49	81	1	0	2	3
Tennessee	2	1	72	43	5	12	2	13
Alabama [3]	0	0	27	44	0	1	0	17
Mississippi	0	1	17	17	0	22	3	4

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended December 31, 1932, and January 2, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Dec. 31, 1932	Week ended Jan. 2, 1932	Week ended Dec. 31, 1932	Week ended Jan. 2, 1932	Week ended Dec. 31, 1932	Week ended Jan. 2, 1932	Week ended Dec. 31, 1932	Week ended Jan. 2, 1932
West South Central States:								
Arkansas	0	0	9	17	0	26	1	2
Louisiana [3]	1	1	9	28	9	2	8	6
Oklahoma [4]	0	0	39	44	10	4	2	5
Texas [3]	0	0	60	49	15	22	0	12
Mountain States:								
Montana	0	3	12	21	0	2	3	1
Idaho	1	0	3	8	5	2	1	0
Wyoming	0	0	4	8	0	1	0	0
Colorado	0	0	42	21	0	5	2	1
New Mexico	0	0	19	20	0	1	4	3
Arizona	0	0	8	6	0	2	0	1
Utah [2]	0	0	9	5	0	0	0	0
Pacific States:								
Washington	1	0	21	56	6	10	0	3
Oregon	0	0	22	31	2	6	1	1
California	0	5	108	115	7	9	5	3
Total	30	51	4,781	4,205	126	339	112	255

[1] New York City only.
[2] Week ended Friday.
[3] Typhus fever, week ended Dec. 31, 1932, 15 cases: 1 case in Maryland, 2 cases in North Carolina, 4 cases in Georgia, 1 case in Alabama, 1 case in Louisiana, and 6 cases in Texas.
[4] Figures for the week ended Dec. 31, 1932, are exclusive of Oklahoma City and Tulsa, and for the week ended Jan. 2, 1932, are exclusive of Tulsa only.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
October, 1932										
Hawaii Territory	1	22	141							6
Nevada		5	54		2		0	8	0	3
November, 1932										
California	13	439	5,800	2	217	4	17	811	9	48
Idaho	2	21	[1] 157		14			24		40
Kansas	10	128	25		33		2	382	7	14
Montana		3	65		723		0	51		13
Nevada		11	256				0	13	0	3
Oklahoma [2]	2	278	157	81	10			156	10	52
Oregon		12	201		163	1	8	100	8	8
Puerto Rico		30	362	4,620	148	2	0		0	15
Washington	2	38	73		9		15	139	19	16
Wisconsin	6	50	171		782		2	403	10	22

[1] Incomplete.
[2] Exclusive of Oklahoma City and Tulsa.

October, 1932

Chicken pox:
- Hawaii Territory 2
- Nevada 2

Conjunctivitis:
- Hawaii Territory 34

Hookworm disease:
- Hawaii Territory 10

Leprosy:
- Hawaii Territory 4

Mumps:
- Hawaii Territory 1

Ophthalmia neonatorum:
- Hawaii Territory 1

Tetanus:
- Hawaii Territory 3

Trachoma:
- Hawaii Territory 27

Whooping cough:
- Hawaii Territory 8
- Nevada 6

November, 1932

Chicken pox:
- California 1,532
- Idaho 78
- Kansas 613
- Montana 246
- Nevada 4
- Oklahoma [1] 26
- Oregon 229
- Puerto Rico 22
- Washington 650
- Wisconsin 262

Conjunctivitis:
- Oklahoma [1] 1

Dysentery:
- California (amebic) 9
- California (bacillary) 48
- Oklahoma [1] 7
- Puerto Rico 2,508
- Washington 7

Filariasis:
- Puerto Rico 4

Food poisoning:
- California 16

German measles:
- California 33
- Montana 2
- Washington 9
- Wisconsin 19

Granuloma, coccidioidal:
- California 2

Hookworm disease:
- California 1

Impetigo contagiosa:
- Kansas 20
- Montana 35
- Oklahoma [1] 1
- Oregon 83
- Puerto Rico 5
- Washington 1

Jaundice, epidemic:
- California 3

Leprosy:
- California 3

Lethargic encephalitis:
- California 6
- Oregon 1
- Washington 4
- Wisconsin 2

Mumps:
- California 537
- Idaho 61
- Kansas 254
- Montana 16
- Oklahoma [1] 9
- Oregon 20
- Puerto Rico 27
- Washington 29
- Wisconsin 364

Ophthalmia neonatorum:
- California 2
- Puerto Rico 6
- Wisconsin 1

Paratyphoid fever:
- California 1
- Puerto Rico 3

Ptomaine poisoning:
- Kansas 2

Puerperal septicemia:
- Puerto Rico 1
- Washington 2

Rabies in animals:
- California 52
- Washington 7

Rabies in man:
- Kansas 1

Relapsing fever:
- California 1

Scabies:
- Kansas 10
- Montana 6
- Oklahoma [1] 1
- Oregon 110

Septic sore throat:
- California 10
- Idaho 2
- Kansas 12
- Montana 2
- Oklahoma [1] 33
- Oregon 1

Tetanus:
- California 8
- Kansas 2
- Montana 1
- Oklahoma [1] 3
- Puerto Rico 11

Tetanus, infantile:
- Puerto Rico 28

Trachoma:
- California 11
- Puerto Rico 17
- Washington 1
- Wisconsin 5

Trichinosis:
- California 10

Tularaemia:
- Kansas 12
- Montana 2
- Oklahoma [1] 2
- Wisconsin 2

Undulant fever:
- California 7
- Kansas 1
- Montana 1
- Washington 2
- Wisconsin 1

Vincent's angina:
- Kansas 10
- Montana 6
- Oklahoma [1] 4
- Oregon 8

Whooping cough:
- California 1,101
- Idaho 3
- Kansas 137
- Oklahoma [1] 28
- Oregon 23
- Puerto Rico 101
- Washington 19
- Wisconsin 426

Yaws:
- Puerto Rico 2

[1] Exclusive of Oklahoma City and Tulsa.

WEEKLY REPORTS FROM CITIES

City reports for week ended December 24, 1932

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Maine:											
Portland	0		0	0	0	0	0	1	0	3	14
New Hampshire:											
Concord	0		0	0	0	1	0	2	0	0	13
Nashua	0		0	0	0	0	0	0	0	0	
Vermont:											
Barre	0		0	0	0	0	0	1	0	0	6
Burlington	1		0	0	0	0	0	0	0	0	7
Massachusetts:											
Boston	14	2	2	26	23	62	0	6	1	61	214
Fall River	1	2	0	0	1	6	0	3	0	7	28
Springfield	0		0	9	0	9	0	0	0	5	32
Worcester	4		0	0	7	22	0	2	1	2	52
Rhode Island:											
Pawtucket	0		0	0	1	0	0	0	0	0	28
Providence	2	1	0	0	8	7	0	4	0	23	62
Connecticut:											
Bridgeport	0	2	0	14	7	9	0	0	0	8	32
Hartford	7		0	2	2	3	0	0	0	5	21
New Haven	1		1	0	3	0	0	0	0	5	30

City reports for week ended December 24, 1932—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
New York:											
Buffalo	3	2	6	3	38	29	0	8	0	14	203
New York	43	177	29	269	220	180	0	70	4	10[illegible]	1,623
Rochester	1	38	2	3	11	15	0	1	0	4	90
Syracuse	0		0	0	5	19	0	1	0	4	56
New Jersey:											
Camden	0	2	1	0	8	7	0	2	0	0	55
Newark	3	23	0	33	8	20	0	6	0	13	
Trenton	1	2	0	0	6	10	0	1	0	0	41
Pennsylvania:											
Philadelphia	5	14	6	16	40	103	0	31	3	5	461
Pittsburgh	5	64	28	1	65	41	0	11	0	12	280
Reading	1		0	73	2	3	0	1	1	3	29
Scranton	3			0		7	0		0	0	
Ohio:											
Cincinnati	2	24	10	0	32	17	0	7	0	1	153
Cleveland	4	366	15	0	36	91	0	13	0	3	233
Columbus	5	9	8	278	10	9	0	6	0	0	93
Toledo	0	6	3	21	11	23	0	1	0	0	72
Indiana:											
Fort Wayne	4		0	1	5	0	0	2	0	0	34
Indianapolis	4		7	4	17	7	0	7	1	5	
South Bend	0		2	0	1	6	0	0	0	1	13
Terre Haute	0		0	2	0	1	0	0	0	0	17
Illinois:											
Chicago	6	63	33	32	78	194	0	45	0	12	790
Springfield											
Michigan:											
Detroit	17	95	9	51	36	[illegible]	0	20	0	62	275
Flint	1	50	1	2	2	4	0	0	0	5	17
Grand Rapids	0		1	5	3	4	0	1	0	30	41
Wisconsin:											
Kenosha	0	35	1	0	1	1	0	0	0	2	8
Madison	2	1		8		2	0		0	0	
Milwaukee	1	18	6	3	12	15	0	5	0	16	128
Racine	2	2	2	0	0	11	0	0	0	0	16
Superior	0		0	1	0	0	0	0	0	0	8
Minnesota:											
Duluth	0		1	0	3	3	0	2	0	2	31
Minneapolis	1	4	19	80	18	19	0	1	0	0	152
St. Paul	0	5	4	1	14	14	0	4	0	15	105
Iowa:											
Des Moines	9			0		7	0		0	0	52
Sioux City	2			0		1	0		0	2	1
Waterloo	1			0		0	0		0	0	
Missouri:											
Kansas City	2	6	2	32	83	23	0	9	0	1	147
St. Joseph	8		0	0	13	3	0	1	2	1	37
St. Louis	16	16	6	2	22	20	0	12	0	0	235
North Dakota:											
Fargo	0		1	0	2	0	0	0	0	0	9
Grand Forks	0		0	12	0	0	0	0	0	0	0
South Dakota:											
Aberdeen	1			0		0	0		0	4	
Nebraska:											
Omaha	7		0	0	18	13	1	1	0	0	83
Kansas:											
Topeka											
Wichita	0		0	0	5	7	0	1	0	0	24
Delaware:											
Wilmington	0		0	0	7	2	0	0	0	0	32
Maryland:											
Baltimore	6	181	7	2	55	56	0	12	0	21	258
Cumberland	0	3	0	0	1	0	0	1	0	0	12
Frederick	1		0	0	0	0	0	0	0	0	1
District of Columbia:											
Washington	2	54	4	2	32	10	0	11	0	6	173
Virginia:											
Lynchburg	2		1	1	4	1	0	0	0	2	18
Norfolk	2	11	0	0	7	4	0	1	1	0	46
Richmond	0		2	0	10	9	0	2	0	0	65
Roanoke	2		0	2	2	2	0	2	0	0	19
West Virginia:											
Charleston	1	27	2	0	5	0	0	1	0	0	12
Huntington	0	178		5		2	1		0	0	
Wheeling	0		1	75	9	1	0	2	0	4	32

City reports for week ended December 24, 1932—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
North Carolina:											
Raleigh	0	-	0	1	0	1	0	1	0	0	---
Wilmington	1	---	0	0	5	0	0	0	1	0	7
Winston-Salem	0	---	0	1	5	0	0	0	0	0	17
South Carolina:											
Charleston	0	94	0	0	2	0	0	2	0	0	22
Columbia	1	---	0	0	0	1	0	0	0	0	---
Greenville	0	---	0	1	0	0	0	0	0	0	---
Georgia:											
Atlanta	3	702	22	0	13	4	0	5	0	5	105
Brunswick	1	--	0	0	0	1	0	0	0	0	3
Savannah	1	57	3	0	6	1	0	2	0	1	38
Florida:											
Miami	1	---	0	0	3	0	0	0	0	0	23
Tampa	---	---	---	---	---	---	---	---	---	---	--
Kentucky:											
Covington	---				---	---	---	---	---	-	
Lexington	0	71	3	0	7	1	0	5	0	0	35
Louisville	2	23	2	0	18	9	0	2	0	0	79
Tennessee:											
Memphis	1	---	14	0	19	5	0	4	0	0	105
Nashville	0	---	10	0	11	2	0	6	0	0	59
Alabama:											
Birmingham	3	104	15	0	8	1	0	2	0	1	84
Mobile	1	3	1	0	4	3	0	0	0	0	22
Montgomery	0	66	---	0	---	2	0	--	0	0	
Arkansas:											
Fort Smith											
Little Rock	0	70	1	0	13	0	0	2	0	0	16
Louisiana:											
New Orleans	13	---	0	0	18	4	0	13	1	0	192
Shreveport	0	---	3	0	15	1	0	3	0	0	51
Oklahoma:											
Tulsa	0	---	---	0	---	2	0	---	0	2	
Texas:											
Dallas	12	179	25	0	19	13	0	3	0	0	103
Fort Worth	2	---	7	2	13	7	0	3	0	0	
Galveston	0	---	0	0	10	0	0	0	0	0	24
Houston	8	---	5	1	10	10	0	5	0	0	68
San Antonio	5	3	15	0	13	2	0	8	0	0	81
Montana:											
Billings	0	---	0	0	0	0	0	0	0	0	7
Great Falls	0		0	113	1	0	0	0	0	0	10
Helena	0	252	1	0	0	0	0	0	0	0	8
Missoula	0	171	1	0	0	0	0	0	0	0	8
Idaho:											
Boise	0		0	6	2	0	5	0	0	0	5
Colorado:											
Denver	4	186	16	5	27	14	0	5	0	1	108
Pueblo	0		1	0	2	1	0	0	0	1	13
New Mexico:											
Albuquerque	0	-	0	0	3	0	0	4	0	4	12
Arizona:											
Phoenix	0	-	0	0	8	0	0	4	0	0	
Utah:											
Salt Lake City	1	-	5	1	1	1	0	1	0	0	51
Nevada:											
Reno	0	--	0	0	0	0	0	0	0	0	4
Washington:											
Seattle	1	--	---	0	---	3	0	--	1	10	
Spokane	0	---	---	0	---	3	1	---	1	0	
Tacoma	0	---	0	0	2	3	0	0	0	0	34
Oregon:											
Portland	0	165	3	0	7	5	0	1	0	0	80
Salem	0	119	---	5	---	1	0	---	0	0	
California:											
Los Angeles	18	198	7	26	27	33	2	30	1	21	362
Sacramento	1	3	0	0	6	0	0	2	0	1	28
San Francisco	0	119	13	2	16	6	0	13	1	14	203

City reports for week ended December 24, 1932—Continued

State and city	Meningococcus meningitis: Cases	Meningococcus meningitis: Deaths	Polio-myelitis cases
Massachusetts:			
Boston	1	2	0
Rhode Island:			
Providence	1	0	0
New York:			
New York	5	2	0
New Jersey:			
Newark	1	1	0
Pennsylvania:			
Philadelphia	0	1	0
Pittsburgh	1	1	0
Ohio:			
Cleveland	1	0	0
Toledo	0	1	0
Indiana:			
Indianapolis	4	1	0
Illinois:			
Chicago	10	2	0
Michigan:			
Detroit	2	0	0
Missouri:			
Kansas City	1	0	0
St. Joseph	2	0	0
St. Louis	2	0	0
District of Columbia:			
Washington	0	1	0
Georgia:			
Atlanta	1	0	0
Kentucky:			
Louisville	0	0	1
Louisiana:			
New Orleans	1	1	0
Washington:			
Seattle	1	0	1
California:			
Los Angeles	2	0	0

Lethargic encephalitis.—Cases: Toledo, 1; Chicago, 1; Birmingham, 1.
Dengue.—Cases: Charleston, S. C., 2.
Pellagra.—Cases: Savannah, 1; New Orleans, 1; Los Angeles, 1.
Typhus fever.—Cases: Savannah, 1; Mobile, 1.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Week ended December 17, 1932.—The Department of Pensions and National Health of Canada reports cases of certain communicable diseases for the week ended December 17, 1932, as follows:

Disease	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis			1						1
Chicken pox			[illegible]	4	[illegible]	1	[illegible]	48	173
Diphtheria	1	[illegible]	[illegible]	1	8	4	1		[illegible]
Dysentery								3	3
Erysipelas			1	[illegible]	1				10
Influenza	1		[illegible]	[illegible]	1			1	913
Lethargic encephalitis				1	1				2
Measles	3	[illegible]	[illegible]	1	1		1	3	33
Mumps				[illegible]	11	[illegible]		1	[illegible]
Pneumonia						[illegible]		13	[illegible]
Poliomyelitis		1	1						
Scarlet fever	[illegible]	1	[illegible]			8	3	1	3
[illegible]				[illegible]					[illegible]
[illegible]					1				[illegible]
Tuberculosis	1	1		[illegible]		11			[illegible]
Typhoid fever		[illegible]	3	1	1			1	12
Whooping cough			[illegible]			5			[illegible]

Ontario Province—Communicable diseases—Four weeks ended November 26, 1932.—The Department of Health of the [illegible] reports certain communicable di[illegible] November 26, 1932 [illegible]

Disease	Cases	Deaths	Disease	Cases	Deaths
[illegible]	1		Pneumonia		74
Chicken pox	113		Poliomyelitis	1	
Diphtheria	[illegible]	1	[illegible]	1	1
Dysentery	1		Scarlet fever	13	
Erysipelas	8		Septic sore throat	1	
German measles	[illegible]		[illegible]		
Gonorrhea	[illegible]		Tuberculosis	13	
Influenza	[illegible]	1	Trench mouth	1	
Lethargic encephalitis	1		Typhoid fever	1	
Measles	[illegible]	1	Undulant fever	10	
Mumps	08		Whooping cough	[illegible]	
Paratyphoid fever	3				

LATVIA

Communicable diseases—August–October, 1932.—During the months of August, September, and October, 1932, cases of certain communicable diseases were reported in Latvia as follows:

Disease	August	September	October	Disease	August	September	October
B[illegible]	1			Mumps	63	11	
Cerebrospinal meningitis	8	4	[illegible]	Paratyphoid fever	[illegible]		11
Diphtheria	0	8	11	Poliomyelitis	1	1	
Dysentery	16	1	1	Puerperal fever	[illegible]		[illegible]
Erysipelas	16	20	20	Scarlet fever	20		[illegible]
Influenza	1	[illegible]	[illegible]	Tetanus	[illegible]		
Leprosy			[illegible]	Trachoma	3	12	1
Lethargic encephalitis	1			Typhoid fever		101	35
Measles	16		20	Whooping cough	103	1	[illegible]

PUERTO RICO

Communicable diseases—Four weeks ended December [illegible], 1932.—During the four weeks ended December [illegible], 1932, cases of certain communicable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
		Ophthalmia neonatorum	6
Bronchitis	[illegible]	Paratyphoid fever	1
Bronchopneumonia		Pellagra	4
Chickenpox	2	Pneumonia	7
Diphtheria	40	Puerperal fever	1
Dysentery	612	Syphilis	17
Filariasis	3	Tetanus	7
[illegible]	2	Tetanus infantile	7
[illegible]	5	Trachoma	10
[illegible]	388	Tuberculosis	349
[illegible]	1,187	Typhoid fever	14
Mumps		Whooping cough	93

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

NOTE.—A table giving current information of the world prevalence of the quarantinable diseases appeared in the Public Health Reports for December 30, 1932, pp. 2382–2391. A similar cumulative table will appear in the Public Health Reports to be issued January 27, 1933, and thereafter, at least for the time being, in the issue published on the last Friday of each month.

Cholera

Philippine Islands.—During the week ended December 31, 1932, 14 cases of cholera with 5 deaths were reported in Leyte Province, Philippine Islands, and 68 cases with 54 deaths in Samar Province.

Plague

Argentina.—On December 16, 1932, two fatal cases of plague were reported in the Province of Cordoba. It was stated that a total of 27 cases of plague had been reported in the Province of Salta.

Egypt—Alexandria.—A fatal case of plague was reported at Alexandria, Egypt, during the week ended December 17, 1932.

Smallpox

Ceylon—Colombo. From November 30 to December 29, 1932, 47 cases of smallpox were reported at Colombo, Ceylon.

China—Canton.—During the week ended December 24, 1932, 213 cases of smallpox with 8 deaths were reported at Canton, China.

Egypt—Alexandria. During the two weeks ended December 21, 1932, 110 cases of smallpox with 36 deaths were reported at Alexandria Egypt

Yellow Fever

Brazil—Ceara State.—On November 2, 1932, a case of yellow fever was reported at Lavras, State of Ceara, Brazil.

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UNITED STATES PUBLIC HEALTH SERVICE

HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst. Surg. Gen. R. C. WILLIAMS, *Chief of Division*

The PUBLIC HEALTH REPORTS are issued weekly by the United States Public Health Service through its Division of Sanitary Reports and Statistics, pursuant to acts of Congress approved February 15, 1893, and August 14, 1912.

They contain: (1) Current information of the prevalence and geographic distribution of preventable diseases in the United States in so far as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other communicable diseases throughout the world. (2) Articles relating to the cause, prevention, or control of disease. (3) Other pertinent information regarding sanitation and the conservation of public health.

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PREVALENCE OF DISEASE

PUBLIC HEALTH REPORTS

VOL. 48 JANUARY 20, 1933 NO. 3

CURRENT PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES[1]

December 4–31, 1932

The prevalence of certain important communicable diseases, as indicated by weekly telegraphic reports from State health departments to the United States Public Health Service, is summarized in this report. The underlying statistical data are published weekly in PUBLIC HEALTH REPORTS, under the section entitled "Prevalence of Disease."

Influenza.—The undue prevalence of influenza in nearly all sections has continued throughout this period In 37 States,[2] the District of Columbia, and New York City a total of 157,682 cases were reported during the four weeks ended December 31, the weekly reports climbing from 24,916 to 53,120 during this period. For the week ended January 7, 1933, 54,694 cases were reported in these States, a figure only slightly above the preceding week. These figures may be compared with reports of from 1,000 to 2,500 cases per week at this season during preceding nonepidemic periods. Table 1 shows, by geographic sections, the reported numbers of cases for recent weeks of this winter and corresponding weeks of last winter:

[1] From the Office of Statistical Investigations, U S Public Health Service The numbers of States included for the various diseases are as follows Typhoid fever, 47, poliomyelitis, 48, meningococcus meningitis, 48, smallpox, 48, measles, 48, diphtheria, 47, scarlet fever, 47, influenza, 38 States and New York City District of Columbia is counted as a State in these reports.

[2] This area is composed of States having continuous records for four years Kansas is omitted because the 106,481 cases reported during the 4-week period followed a special letter to physicians asking their cooperation in obtaining complete reports.

Weekly numbers of reported cases of influenza during certain weeks of 1932–33 and corresponding weeks of preceding years

Geographic area and years	Week ended—											
	Oct. 22	Oct. 29	Nov. 5	Nov. 12	Nov. 19	Nov. 26	Dec. 3	Dec. 10	Dec. 17	Dec. 24	Dec. 31	Jan. 7
37 States,* District of Columbia, and New York City:												
1932–33	1,279	1,094	1,346	1,628	2,968	6,146	13,873	24,916	33,928	45,718	53,120	54,[illegible]91
1931–32	487	608	675	1,046	866	519	561	987	872	600	1,690	1,20[illegible]
1930–31	550	665	835	910	1,004	997	1,098	1,182	1,219	1,139	1,050	2,[illegible]23
1929–30	736	840	1,015	1,074	1,294	1,316	1,241	1,800	1,953	1,565	1,764	2,527
New England:												
1932–33	5	4	8	3	37	13	24	15	24	33	207	914
1931–32	17	13	10	8	18	3	17	11	24	15	22	25
Middle Atlantic:												
1932–33	38	26	15	21	37	23	30	50	77	227	813	1,213
1931–32	13	28	10	22	18	27	29	22	21	20	30	51
East North Central:												
1932–33	67	142	56	159	79	87	137	461	973	949	3,614	7,295
1931–32	26	38	35	52	25	52	21	125	13	25	76	50
West North Central:												
1932–33	1	5	3	0	9	3	130	133	237	1,578	[1] 15,494	2,596
1931–32	5	4	25	322	7	21	10	8	8	7	8	15
South Atlantic:												
1932–33	400	407	410	426	530	544	907	3,293	5,736	4,463	7,100	11,364
1931–32	315	380	404	461	569	544	540	530	507	322	540	536
East South Central:												
1932–33	60	53	75	77	475	2,109	4,473	8,565	10,801	6,910	8,522	5,083
1931–32	16	39	40	60	73	50	35	58	44	52	101	99
West South Central:												
1932–33	129	125	89	171	149	831	1,650	9,236	12,020	23,998	16,127	18,203
1931–32	29	34	59	36	46	41	82	99	51	42	77	157
Mountain:												
1932–33	73	82	300	226	667	702	4,529	1,131	2,014	4,799	7,452	5,696
1931–32	8	6	4	9	12	15	15	11	13	5	10	25
Pacific:												
1932–33	506	250	390	545	985	1,834	1,993	2,027	2,040	2,852	3,731	2,324
1931–32	59	66	88	76	100	60	102	123	151	113	229	168

* States included are as follows: *New England:* Maine, Vermont, Massachusetts, Rhode Island, Connecticut; *Middle Atlantic:* New Jersey; *East North Central:* Ohio, Illinois Michigan, Wisconsin; *West North Central:* Minnesota, Missouri, North Dakota, South Dakota, Nebraska; *South Atlantic:* Delaware, Maryland, West Virginia, South Carolina, Georgia, Florida; *East South Central:* Tennessee, Alabama; *West South Central:* Arkansas, Louisiana, Oklahoma, Texas; *Mountain:* Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah; *Pacific:* Washington, Oregon, California.

[1] Includes 4,618 cases reported from North Dakota.

The epidemic seems to have started in the West and South, with a peak in reported cases in California in the latter part of November. The southern tier of the Mountain States and several of the South Central States followed, with peaks in the first half of December and in the last half of December. The northern tier of the Pacific and Mountain States showed peaks of reported cases in the last half of December, as did also the majority of the North Central States. The peak of reported cases in Georgia came in the first half of December, but the majority of South Atlantic States reported the maximum number of cases during the first week of January, the last week for which records are now available. In the Middle Atlantic and New England States the epidemic was apparently in its earlier stages at the date of the latest report included here, the last week's report indicating the maximum cases up to that time. In its place of origin and its travel from west to east the present epidemic resembles the epidemics of 1928–29 and 1926. The 1918–19 pandemic, on the other hand, began in the northeast and traveled generally to the west and south.

Mortality records indicate that the cases have been of a mild type. A rise in the mortality from all causes in 85 cities (Weekly Health Index) began in the first week in December from an exceptionally low level that has persisted throughout 1932 and 1931. For the week ended December 31 the death rate (annual basis) was 14.7, as compared with about 12 in 1931 and 1930, and with about 13 to nearly 14 in 1929 and 1927. The rise in mortality in these cities in the 1928-29 epidemic began about the same calendar week that it did in this epidemic, and in the five weeks to the last of December, 1928, had risen from 12.7 to 18.0, as compared with a rise from 11.0 to 14.7 this year. The first week in January of 1929 the rate rose further to 19.5, but for the week ended January 7, 1933, it fell from 14.7 to 13.6.

The cities with the highest mortality thus far in the present epidemic are Denver, New Orleans, Memphis, Nashville, Cincinnati, Columbus, Des Moines, Pittsburgh, Richmond, Va., Washington, D. C., and El Paso.

Typhoid fever.—Typhoid fever continued its downward trend. The number of cases (680) reported for the current period was only about 50 per cent of the number reported for the preceding 4-week period. Compared with recent years the incidence was the lowest for this period in the four years for which data are available. It was approximately 45 per cent less than the incidence in 1931 and 1930 but only about 20 per cent below the incidence in 1929.

For the week ended January 7, 1932, there were 170 cases of typhoid fever reported from Chamberlain, S. Dak., a small town of 1,358 inhabitants.

Poliomyelitis.—The incidence of poliomyelitis continued considerably below the level of either of the two preceding years, but very closely approximated the incidence in 1929. The number of cases reported for the four weeks ended December 31 was 110, as compared with 266, 332, and 115 for the corresponding period in the years 1931, 1930, and 1929, respectively. Each geographic area shared in this favorable situation.

Smallpox.—The number of cases of smallpox reported for the current 4-week period represented only a normal seasonal increase. In relation to recent years the incidence still maintained the low level which has prevailed throughout the current year. The number of cases (512) was about 40 per cent of the number recorded for the corresponding period in 1931, 25 per cent of the 1930 figure, and 11 per cent of the number reported in 1929. Each geographic area showed a similar relationship to the preceding years

Meningococcus meningitis.—The relatively low incidence of meningococcus meningitis which has prevailed throughout the year was maintained during the current 4-week period. The incidence, however, came closer to that for a corresponding period last year than during any other 4-week period in the current year. For the four weeks ended December 31 there were 241 cases reported, as against 280, 370, and 709 in 1931, 1930, and 1929, respectively. For the country as a whole and for each geographic area the incidence was the lowest for this period in recent years.

Diphtheria.—A normal seasonal decline in the incidence of diphtheria was reported from all sections of the country during the four weeks ended December 31. The number of cases (4,594) was the lowest for this period in the four recent successive years for which data are available. Each geographic area also reported appreciable decreases from the figures for the corresponding period in recent years.

Scarlet fever.—The reported current incidence of scarlet fever was about 16 per cent in excess of that for the corresponding period in each of the years 1931 and 1930 and about 9 per cent in excess of the figure for 1929. A comparison of geographic areas shows that the disease was considerably more prevalent in the Middle Atlantic, South Atlantic, and West South Central areas than it was at this time last year. In the Mountain region the incidence was approximately the same as that of last year, and in the Pacific area a decrease of about 13 per cent was reported.

Measles.—Reports indicated a normal seasonal increase of measles during the four weeks ended December 31. The total number of cases reported was 13,942, as compared with 14,298, 12,757, and 14,672 for the corresponding period in the years 1931, 1930, and 1929, respectively. Each geographic area except the New England and the Middle Atlantic showed an increase over last year, but the dis-

ease seemed to be most prevalent in the North and South Central areas. Michigan, Wisconsin, and North Dakota in the former group, and Texas in the latter group were mostly responsible for the increase in those groups. The Middle Atlantic States reported a decrease of approximately 2,000 from last year's figure, and the New England States, where the disease was unusually prevalent during December of last year, reported only 570 for the current period, as compared with 5,084 last year.

Deaths, all causes.—Deaths from all causes in large cities, as reported by the Bureau of the Census, rose from 11.2 for the preceding 4-week period to 13.4 for the four weeks ended December 31. This rate was the highest for a corresponding period in recent years since 1928, when the rate was 15.6. For this same period in 1931, 1930, and 1929 the rate was 11.4, 12.3, and 13.1, respectively. The cause of the increase was apparently influenza.

For the week ended January 7, 1933, the rate was 13.6, as compared with 14.1, 12.8, and 19.5 for the same week in the years 1931, 1930, and 1929, respectively. The first week of 1929 came during the influenza epidemic of that year.

THE PELLAGRA-PREVENTIVE VALUE OF AUTOCLAVED DRIED YEAST, CANNED FLAKED HADDOCK, AND CANNED GREEN PEAS

By G. A. WHEELER, *Surgeon, United States Public Health Service*

The studies here reported were carried out at the Milledgeville State Hospital (formerly the Georgia State Sanitarium), Milledgeville, Ga. As in feeding experiments previously reported from this station (1) the substances under test were used as supplements to a basic diet designed to meet all known physiological requirements with the exception that it is deficient in the pellagra-preventive vitamin. When used alone this basic diet leads to the production of pellagra (2) within from three to six months. Any conspicuous prolongation of this period must therefore be attributed to the pellagra-preventive power of the substance with which it is supplemented. The general policy of permitting each test to run for at least one year, unless sooner terminated by significant developments, has been adhered to in these studies.

AUTOCLAVED YEAST

In their study of the problem of an experimental animal for pellagra Goldberger and Wheeler (3) were able to produce the syndrome known as blacktongue in the dog, a condition strikingly similar to human pellagra, by feeding with pellagra-producing diets. These

tests have since been extended to include a test of the relative pellagra-preventive potency of a large number of individual foods and foodstuffs, each of which has been found to bear a similar etiological and therapeutic relationship to both pellagra and blacktongue. These findings, together with the striking similarity of their clinical features, epidemiology and histopathology (4) have led to the conclusion that these conditions are analogous.

Early in the course of these studies it was found that dried yeast has a high degree of curative and preventive value in blacktongue. This led to a similar test (5) of this substance in human pellagra, the results of which were equally gratifying. Further studies (6) of dried yeast by feeding experiments in dogs showed that the factor in yeast responsible for the cure and prevention of blacktongue is inactivated or destroyed by heat sufficient to char the yeast but retains its potency after heating in the steam autoclave at a pressure of 15 pounds for 7½ hours. It was also shown by these studies that this factor is capable of being adsorbed by fuller's earth from an acidulated aqueous extract of either plain dried yeast or dried yeast which had been previously autoclaved The aqueous extract of plain yeast was later tested in human pellagra (7) and found to be efficacious in both its treatment and prevention.

These studies thus definitely established the water solubility of the pellegra and blacktongue preventive factor and, in so far as the dog is concerned, the stability of this factor in the presence of the heat of the autoclave. They also established another important point, and one which does not appear to have been fully appreciated by the medical profession generally, viz, the practical exclusion of the protein factor *per se* as an essential agent in either the production or prevention of blacktongue or pellagra. The dried, watery extract of yeast is, even in relatively small quantity, highly protective against both conditions; and since this substance is very low in nitrogen, the amount of protein supplied by it is, at most, a negligible quantity.

Both the water-soluble and heat-stable properties of the accessory food factor concerned in pellagra are of prime practical importance in connection with ordinary cooking and the processing of foods incident to canning. The former having already been tested in man, it seemed advisable to make also this final confirmatory test of the latter. Furthermore, such a step is in keeping with the previously established policy of checking, so far as practicable, every important angle of the information relating to pellagra by actual test in man.

The yeast used was dried baker's yeast which had been exposed to the heat of the steam autoclave at 15 pounds pressure for 7½ hours. Tests on rats showed that the autoclaving process had destroyed practically all of the antineuritic vitamin. The approxi-

mate composition of the autoclaved yeast-supplemented diet used in the human test is given in Table 1.

Eighteen white female inmates came under observation on this diet, 15 of whom continued on it for a period of one year. No evidence of pellagra was observed

In view of the fact that without the autoclaved yeast supplement pellagra would have developed within three to six months, freedom from the disease can be attributed only to the preventive effect of the autoclaved yeast.

CANNED HADDOCK

In studying the blacktongue and pellagra preventive value of the more moderately priced canned fish, Goldberger, Wheeler, Rogers, and Sebrell (8) found that canned flaked haddock contains the blacktongue-preventive factor, and when used in relatively large proportion the clinical manifestations of blacktongue were prevented.. However, while 3 of their group of 6 dogs on the haddock-supplemented diet were apparently in good health at the end of 20 months, the other three, though they did not develop the usual symptoms of blacktongue, showed at autopsy a fatty degeneration of the liver, which condition has been reported by Sebrell (9).

Soon after the study of haddock was started in the dog, a similar study was begun in the human being. The basic diet to which the haddock was added was the same as that in the study of autoclaved yeast, with the exception that the flour and lard components were slightly increased and the cottonseed oil was reduced The same commercial brand of canned flaked haddock was used in both the dog and human tests.

The approximate composition of the haddock-supplemented diet used in the human test is given in Table 2.

Sixteen colored female inmates were placed on this diet, all of whom after a period varying from two and one-half to six months showed to some degree one or more of the following symptoms: A characteristic pellagrous stomatitis or a more chronic, low-grade, often foul, congestion of the tongue and buccal mucosa, followed by denudation of the surface epithelium. Moist erosions and fissuring at the angles of the mouth, involving both the mucous and cutaneous surfaces; seborrhea about the nose; a moist soft caseous deposit, often a distinct line, on a reddened background, about the base of the nose, particularly in the nasio-labial folds, the angle formed by the nasal septum and upper lip, and the fold between the lower lip and chin. In a few instances similar changes were present between the toes and fingers and in the folds of the outer ear. Conjunctivitis or ophthalmia with maceration and excoriation of the skin covering the upper and lower eyelids and scaly incrustation and deposits about

the lid margins and canthi were frequently noted. In a few instances the folds of the groin and genitalia showed a moist, macerated, and excoriated condition. One developed a typical pellagrous skin eruption, and two showed a disturbance in gait characterized by slowness and uncertainty. There was occasional vomiting among those more extensively involved.

The administration of 15 grams of autoclaved baker's yeast, or the addition of pellagra-curative foods to the haddock-supplemented diet, was followed by the disappearance of these symptoms.

While symptoms of the type described above have been long observed in association with the more typical symptoms of pellagra, it appears from a review of the literature that they have been previously encountered but twice, to a dominant degree, and in both instances under very restricted and rigid dietetic conditions.

Stannus (10) describes 131 cases of what he decided was pellagra as occurring among the inmates of Central Prison, Zombo, Nyasaland. Their food consisted principally of "rice, salt, and a certain amount of fish and beans." In describing the clinical aspects of the condition he observed, the author lays stress on the "almost constant occurrence of the rhagadeslike soreness at the mucocutaneous borders at the corners of the mouth," and a similar condition affecting the free margin of the prepuce, "the skin in these situations being thrown into sodden folds of a grayish color." The dorsum of the tongue, at first covered by "heaped-up sodden epithelium," later became denuded. In some of the older and more severe cases a similar change was seen at the external canthus of the palpebral fissure and at the nostrils. A disturbance of gait is also mentioned. According to this observer, these signs appear early in the disease and may persist for many months before the characteristic dermatitis makes its appearance, which he states is often delayed a season. In summing up the results of his observations, this author states as follows:

> The disease which I have attempted to describe above, presenting the picture of a toxæmia attacking the nervous system, rendering the skin more liable to irritation by the sun's rays, with the production of a symmetrical characteristic rash of particular distribution recurring in successive years, is, I believe, undoubtedly pellagra.

It will be noted, however, that the opinion expressed by Stannus that the skin is rendered more liable to irritation by the sun's rays is not very impressively borne out by the results here considered. The haddock diet was begun on October 28, and the symptoms described became well established during the cooler months. Although continued under observation throughout the following spring, summer, and early fall, only one of this group developed the characteristic dermatitis. This was first observed on April 6, or about six weeks following the appearance of fissuring and excoriation at the angles of

the mouth, which were the only changes observed prior to the appearance of the eruption.

Symptoms in most respects strikingly similar to those described by Stannus, and practically identical with those associated with the haddock-supplemented diet, were observed by Goldberger and Tanner (5) in their study of the pellagra-preventive effect of casein. Inasmuch as most of the symptoms described by them, including the disturbance in gait, had been previously observed in cases of pellagra, these authors were inclined to believe that their casein-supplemented diet carried sufficient of the pellagra preventive to control, in a large measure, the dermatitis, but not enough to prevent the other unfavorable symptoms which they regarded as "either suggestive of or definitely *pellagra sine pellagra*." However, the "accumulation of a pasty, caseous material on a linear reddening of the skin" in the groove at the angles of the nose and in the transverse fold below the nasal septum, the conjunctivitis and deposits about the canthi and lid margins, though touched upon by Stannus, appear not to have been previously observed by these authors in either spontaneous cases of pellagra or cases experimentally induced. All the symptoms observed in their cases appear to have responded promptly and satisfactorily to a supplement of plain dried yeast.

The fact that these unfavorable symptoms are promptly overcome and apparently prevented through the administration of yeast or other pellagra-curative food supplements suggests very strongly that they are of dietary origin; and since autoclaved yeast appears to be as efficacious as unheated yeast, the factor concerned may be regarded as resistant to the heat of the autoclave. On this basis several possible explanations were presented.

It was reasoned, as suggested by Goldberger and Tanner, that the amount of the pellagra preventive in the haddock and casein diets, as well as in the diet prevailing in the Nyasaland prison, may have been high enough to noticeably delay, modify, or altogether to prevent the appearance of the more acute and distinctive dermal symptoms yet low enough to permit of the evolution of these more chronic larval manifestations of the disease.

On the other hand, it seemed conceivable that some form of intoxication, arising directly or indirectly from the casein and haddock supplements and capable of being prevented or neutralized by various dietary supplements, including the heat-stable component of dried yeast, might possibly be concerned.

There was also presented the possibility, as had been previously suggested by Goldberger and Wheeler (11), that there may be two separate dietary factors concerned in pellagra, one having to do with the evolution of the dermal manifestations, the other with symptoms

representing the type here encountered, or so-called *pellagra sine pellagra*. This would imply, of course, that the haddock and casein-supplemented diets were much less deficient in the former factor than in the latter.

It seemed reasonable to assume that, if these are larval manifestations of pellagra brought about simply because the degree of protection for the group as a whole falls a little short of adequacy, they should be reduced or prevented by a substantial increase in the proportion of haddock, and, conversely, a substantial decrease in the proportion of this substance should permit of the development, to a dominant degree, of the more familiar array of pellagrous manifestations. Likewise, should a toxin of some sort be primarily concerned, a larger quantity of haddock might be expected to produce these symptoms in a more aggravated form while a reduced quantity should have the opposite effect. It also seemed that should two separate dietary factors be involved, a significant increase in the proportion of haddock would have a favorable influence on these symptoms, while a reduced amount would not; that is, provided canned haddock is not wholly deficient in the factor concerned in these symptoms, in which case they should show little variation regardless of the quantity used.

The following experiments designed to test these possibilities were therefore carried out:

Sixteen colored female inmates were placed on a diet in which the allowance of haddock was increased by 50 per cent, and 12 white female inmates on one in which the haddock was reduced by 50 per cent. In order to compensate for the energy value of the different levels of haddock used in these tests, the cottonseed oil was dropped in the former, the lard reduced by 8 grams and the flour by 7 grams in both, and 28 grams of cane sirup were added to the latter. Aside from these changes, the basic diet was the same as in the original haddock study.

The approximate composition of these diets is given in Tables 3 and 4.

Of the group of 16 receiving an increased quantity of haddock, 14 were continued under observation for a period of one year. Aside from the appearance of a slight and transient scaly deposit about the nasio-labial folds in one of the group, no symptoms, typical or atypical, suggestive of pellagra were observed.

Of the group of 12 receiving the reduced amount, 11 were continued under observation for a period of nine months. Of this number, four showed typical symptoms of pellagra, one of these showing in addition a sebaceous deposit about the nasio-labial folds and at the base of the nasal septum, and excoriation about the angles

of the mouth. This test was terminated upon the development of the fourth case of pellagra.

The information supplied by these additional experiments can not be considered conclusive as regards any one of the points at issue. The practical absence of unfavorable symptoms of any kind under the use of an increased quantity of haddock strongly suggests that a toxic condition due to the haddock *per se* is not involved. However, their greatly reduced incidence under the use of a reduced amount of this substance, though perhaps less significant, is not entirely out of harmony with such a view.

Though it may have more in its favor, the same may be said of the possibility that two separate and distinct dietary factors are involved in pellagra The practical prevention of pellagrous symptoms of all kinds by the use of a larger quantity of haddock is not inconsistent with this view. However, the fact that these less typical symptoms were strikingly reduced, while the frank manifestations were sharply increased, under the smaller allowance of haddock can not be reconciled with such a hypothesis.

Whether this array of symptoms may be the result of a submarginal or borderline supply of the pellagra-preventive factor likewise remains obscure. However, this view seems to have more in its favor in that the results of all three of the haddock tests are not inconsistent with such a possibility.

Whether the relative infrequency of these symptoms in the ordinary run of pellagra cases is more apparent than real is an open question. Except in extreme cases these less familiar symptoms are also less conspicuous and may often be overlooked or their significance unappreciated, especially in those instances in which the more classical clinical symptoms are outstanding.

However this may be, since both types of lesions seem to be peculiar to the pellagrous state, apparently arising from a common dietary fault and responding alike to the same dietary supplements, they may, for practical purposes at least, be regarded as belonging to the same clinical syndrome. Viewed from this angle, their more specific relationship becomes largely an academic question.

This, as well as other complex and perplexing questions, will doubtless be more clearly answered when the many and profound mysteries of nutrition are more fully revealed. However this may eventually turn out, the immediate objective of this work—the determination of the relative pellagra preventive potency of canned haddock—has been fully attained. These tests have shown in a most convincing manner that when a large proportion of haddock is added to an otherwise pellagra-producing diet practically all clinical manifestations of the disease are prevented, and that when smaller amounts are used

pellagra appears, the number of cases being in inverse proportion to the quantity of haddock supplied.

CANNED GREEN PEAS

In continuation of the study of the relative pellagra-preventive value of fresh vegetables (1), particularly those which may be easily grown in the South and made available early in the spring when the dietary of the pellagrous sections is most restricted, it seemed desirable to make such a test of the green pea (*Pisum sativum*). This foodstuff is known in many sections as the garden or English pea in contradistinction to the field pea, or cowpea, and, unlike these, is not ordinarily used in the mature dry form. Since the fresh green peas are not available for the length of time required for the human test, the canned product was used. The approximate composition of the green pea supplemented diet is shown in Table 5.

A group of 14 white female inmates was used in this test. Of these, 10 continued under observation on the canned green pea supplemented diet for a period of 1 year, 2 for 10⅝ months, 1 for 8 months, and 1 for 6½ months. No evidence of pellagra was observed.

In view of the fact that without the green peas pellagra would have developed within from three to six months, freedom from the disease must be credited to the protective value of this supplement.

SUMMARY AND CONCLUSIONS

1. Dried baker's yeast (autoclaved), canned flaked haddock, and canned green garden or English peas have been tested for their pellagra-preventive potency.

2. Dried baker's yeast is a good source of the pellagra-preventive factor, and its potency is retained after heating in the steam autoclave at 15 pounds pressure for 7½ hours.

3. Canned flaked haddock contains the pellagra-preventive factor but in an amount so small that a relatively large proportion is required adequately to supplement an otherwise pellagra-producing diet. Some less commonly observed symptoms associated with the use of an intermediate allowance of haddock are described and their significance is briefly discussed.

4. Canned green peas supply the pellagra-preventive factor and may be found a highly practical and convenient source of this essential in the pellagrous sections during the spring months when pellagra-preventive supplements are scarcest.

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DIET TABLES

TABLE 1.—*Basic diet plus 60 grams of autoclaved yeast* [1]

[Total calories, 2,027]

Article of diet	Quantity	Nutrients: Protein	Nutrients: Fat	Nutrients: Carbohydrate
Basic:	*Grams*	*Grams*	*Grams*	*Grams*
Corn meal	270	22.7	12.7	199.8
Cowpeas (Vigna sinensis)	42	10.0	.6	25.5
Flour	21	2.4	.2	15.8
Lard	42		42.0	
Tomato juice (canned)	127			
Cod-liver oil	14		14.0	
Cottonseed oil	10		10.0	
Calcium carbonate	3			
Sirup iodide of iron	2 drops.			
Dilute hydrochloric acid, U. S. P.	90 drops.			
Supplemental: Yeast (autoclaved)	60	17.9	1.1	31.3
Total nutrients		53.0	80.6	272.4

[1] The corn meal, cowpeas, and a portion of the lard were cooked in a mixture, to which the autoclaved yeast and calcium carbonate were added. The flour and the remainder of the lard were used as a brown gravy.
The cod-liver oil, cottonseed oil, sirup iodide of iron, and hydrochloric acid were given mixed with the tomato juice.
The yeast used was dried baker's yeast which had been autoclaved at 15 pounds pressure for 7½ hours.

TABLE 2.—*Basic diet plus 227 grams canned flaked haddock* [1]

(Total calories, 2,079)

Article of diet	Quantity	Nutrients		
		Protein	Fat	Carbohydrate
Basic:	*Grams*	*Grams*	*Grams*	*Grams*
Corn meal	270	22.7	12.7	199.8
Cowpeas (Vigna sinensis)	42	10.0	.6	25.5
Flour	28	3.0	.3	21.0
Lard	50		50.0	
Tomato juice (canned)	127			
Cod-liver oil	14		14.0	
Cottonseed oil	6		6.0	
Calcium carbonate	3			
Sirup iodide of iron	2 drops.			
Dilute hydrochloric acid, U. S. P.	90 drops.			
Supplemental. Haddock (canned)	227	48.6	.5	
Total nutrients		84.3	84.1	246.3

[1] The corn meal, cowpeas, and a portion of the lard were cooked in a mixture, to which the calcium carbonate and canned haddock were added. The flour and the remainder of the lard were used as a brown gravy.

The cod-liver oil, cottonseed oil, sirup iodide of iron, and hydrochloric acid were given, mixed with the tomato juice.

TABLE 3.—*Basic diet plus 340 grams canned flaked haddock* [1]

(Total calories, 2,028)

Article of diet	Quantity	Nutrients		
		Protein	Fat	Carbohydrate
Basic:	*Grams*	*Grams*	*Grams*	*Grams*
Corn meal	270	22.7	12.7	199.8
Cowpeas (Vigna sinensis)	42	10.0	.6	25.5
Flour	21	2.4	.2	15.8
Lard	42		42.0	
Tomato juice (canned)	127			
Cod-liver oil	14		14.0	
Calcium carbonate	3			
Sirup iodide of iron	2 drops.			
Dilute hydrochloric acid, U. S. P.	90 drops.			
Supplemental: Haddock (canned)	340	73.0	.7	
Total nutrients		108.1	70.2	241.1

[1] The corn meal, cowpeas, and a portion of the lard were cooked in a mixture, to which the calcium carbonate and canned haddock were added. The flour and the remainder of the lard were used as a brown gravy.

The cod-liver oil, sirup iodide of iron, and hydrochloric acid were given, mixed with the tomato juice.

TABLE 4.—*Basic diet plus 113 grams canned flaked haddock* [1]

(Total calories, 2,023)

Article of diet	Quantity	Nutrients		
		Protein	Fat	Carbohydrate
Basic:	*Grams*	*Grams*	*Grams*	*Grams*
Corn meal	269	22.7	12.7	199.8
Cowpeas (Vigna sinensis)	42	10.0	.6	25.5
Flour	21	2.4	.2	15.8
Lard	42		42.0	
Tomato juice (canned)	127			
Cane sirup	28			20.0
Cottonseed oil	14		14.0	
Cod-liver oil	14		14.0	
Calcium carbonate	3			
Sirup iodide of iron	2 drops.			
Dilute hydrochloric acid, U. S. P.	90 drops.			
Supplemental: Haddock (canned)	113	24.1	.2	
Total nutrients		59.2	83.7	261.1

[1] The corn meal, cowpeas, and a portion of the lard were cooked in a mixture, to which the calcium carbonate and canned haddock were added. The flour and the remainder of the lard were used as a brown gravy.
The cod-liver oil, cottonseed oil, cane sirup, sirup iodide of iron, and hydrochloric acid were given mixed with the tomato juice.

TABLE 5.—*Basic diet plus canned green peas* [1]

(Total calories, 2,034)

Article of diet	Quantity	Nutrients		
		Protein	Fat	Carbohydrate
Basic:	*Grams*	*Grams*	*Grams*	*Grams*
Corn meal	270	22.7	12.7	199.8
Cowpeas (Vigna sinensis)	42	10.0	.6	25.5
Lard	42		42.0	
Flour	21	2.4	.2	15.8
Tomato juice (canned)	127			
Cod-liver oil	14		14.0	
Calcium carbonate	3			
Sirup iodide of iron	2 drops.			
Dilute hydrochloric acid, U. S. P.	90 drops.			
Supplemental: Green peas (canned, including can liquor)	450	18.4	.4	56.7
Total nutrients		53.5	69.9	297.8

[1] The corn meal, cowpeas, and a portion of the lard were cooked in a mixture, to which the calcium carbonate was added.
The cod-liver oil, sirup iodide of iron, and hydrochloric acid were given mixed with the tomato juice.

DEATHS DURING WEEK ENDED DECEMBER 31, 1932

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce

	Week ended Dec. 31, 1932	Corresponding week, 1931
Data from 85 large cities of the United States:		
Total deaths	10,273	8,330
Deaths per 1,000 population, annual basis	14.7	12.1
Deaths under 1 year of age	710	608
Deaths under 1 year of age per 1,000 estimated live births [1]	58	48
Deaths per 1,000 population, annual basis, first 52 weeks of year	11.2	11.7
Data from industrial-insurance companies:		
Policies in force	69,085,125	74,151,074
Number of death claims	15,146	13,832
Death claims per 1,000 policies in force, annual rate	11.5	9.7
Death claims per 1,000 policies, first 52 weeks of year, annual rate	9.6	9.6

[1] 1932, 81 cities; 1931, 77 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended January 7, 1933, and January 9, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended January 7, 1933, and January 9, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Jan. 7, 1933	Week ended Jan. 9, 1932	Week ended Jan. 7, 1933	Week ended Jan. 9, 1932	Week ended Jan. 7, 1933	Week ended Jan. 9, 1932	Week ended Jan. 7, 1933	Week ended Jan. 9, 1932
New England States:								
Maine	3	6	578	8	1	548	0	3
New Hampshire	1	5			2	27	0	0
Vermont	2					193	0	0
Massachusetts	33	69	173	4	141	429	1	0
Rhode Island	5	12	74	4		866	0	1
Connecticut	14	9	89	0	84	104	2	1
Middle Atlantic States:								
New York	65	104	[1] 794	[1] 26	854	773	5	15
New Jersey	26	51	419	25	200	78	2	1
Pennsylvania	79	145			374	1,425	4	3
East North Central States:								
Ohio	61	94	531	14	332	121	3	1
Indiana	70	68	1,652	9	15	119	6	11
Illinois	64	179	186	33	81	53	22	15
Michigan	17	22	147	6	239	165	0	2
Wisconsin	9	23	6,431	27	193	48	5	1
West North Central States:								
Minnesota	5	30	35	1	230	69	2	3
Iowa	18	33	1,717		3	2	8	2
Missouri	37	57	200	3	32	10	3	4
North Dakota	1	30	1,888		64	32	1	2
South Dakota	6	5	205		7	21	0	1
Nebraska	10	18	208	11	3	19	0	0
Kansas	12	41	7,923	5	33	50	1	0
South Atlantic States:								
Delaware	6	4	2	3	1		0	0
Maryland [2]	13	45	2,064	26	9	4	2	2
District of Columbia	6	21	21	3	2	2	2	2
Virginia [3]	31				139		2	
West Virginia	23	48	4,018	36	157	301	1	1
North Carolina	23	67	1,827	22	314	125	2	0
South Carolina	13	12	3,667	429	63	43	0	0
Georgia	15	12	1,490	88		1	1	2
Florida [3]	8	15	102	1	1		0	0
East South Central States:								
Kentucky	29	54	4,428			32	6	1
Tennessee	11	43	2,614	41	5	10	1	3
Alabama [3]	23	20	2,475	58		9	2	0
Mississippi	7	22					0	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended January 7, 1933, and January 9, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Jan. 7, 1933	Week ended Jan. 9, 1932	Week ended Jan. 7, 1933	Week ended Jan. 9, 1932	Week ended Jan. 7, 1933	Week ended Jan. 9, 1932	Week ended Jan. 7, 1933	Week ended Jan. 9, 1932
West South Central States:								
Arkansas	7	22	11,138	26	4	3	0	0
Louisiana	16	32	653	25	8	14	3	0
Oklahoma [4]	18	57	1,900	10		6	1	0
Texas [1]	285	164	4,452	62	20	13	1	0
Mountain States:								
Montana	2		5,493	14	175	221	0	1
Idaho	5		5	2	12		0	0
Wyoming		1	15	3	14	1	0	0
Colorado	4	15	138		6	8	0	2
New Mexico	3	21	7	5	2	4	0	1
Arizona	3	4	26	1		4	0	0
Utah [2]	1		12		1		0	0
Pacific States:								
Washington	4	4	11		1	372	1	1
Oregon	1	3	1,274	45	24	35	1	0
California	51	82	1,039	123	98	207	7	6
Total	1,155	1,767	72,241	1,258	4,004	6,567	98	88

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Jan. 7, 1933	Week ended Jan. 9, 1932	Week ended Jan. 7, 1933	Week ended Jan. 9, 1932	Week ended Jan. 7, 1933	Week ended Jan. 9, 1932	Week ended Jan. 7, 1933	Week ended Jan. 9, 1932
New England States:								
Maine	2	3	29	40	0	0	0	1
New Hampshire	0	0	21	14	0	0	0	0
Vermont	0	0	28	4	0	3	1	0
Massachusetts	1	1	347	440	0	0	2	11
Rhode Island	0	0	37	35	0	0	0	0
Connecticut	0	2	91	79	0	15	0	0
Middle Atlantic States:								
New York	1	9	637	653	0	7	10	20
New Jersey	1	1	245	228	0	0	1	7
Pennsylvania	2	1	692	580	0	0	20	22
East North Central States:								
Ohio	1	0	569	338	9	29	7	10
Indiana	0	0	164	153	3	4	2	7
Illinois	2	5	414	429	3	34	0	10
Michigan	0	5	152	194	1	20	1	9
Wisconsin	1	0	62	95	1	8	1	0
West North Central States:								
Minnesota	1	3	76	99	3	11	0	1
Iowa	0	1	27	43	39	78	0	1
Missouri	0	0	108	75	4	26	3	4
North Dakota	0	1	23	14	0	79	0	1
South Dakota	0	0	6	6	2	8	173	2
Nebraska	1	0	46	21	1	12	0	1
Kansas	1	0	71	49	2	2	0	6
South Atlantic States:								
Delaware	0	0	10	13	0	0	0	0
Maryland [2]	0	0	81	100	0	0	7	8
District of Columbia	0	1	14	23	0	0	0	1
Virginia [3]	0		65		0		11	
West Virginia	0	0	56	48	1	0	0	13
North Carolina	0	1	46	84	0	0	4	6
South Carolina	2	0	9	16	2	2	2	12
Georgia	1	0	5	24	0	0	5	13
Florida [3]	0	0	3	4	0	0	5	5
East South Central States:								
Kentucky	0	3	40	97	1	0	2	12
Tennessee	1	1	40	71	0	10	10	17
Alabama [3]	0	2	27	46	2	3	1	9
Mississippi	0	0	19	18	0	11	2	5

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended January 7, 1933, and January 9, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Jan. 7, 1933	Week ended Jan. 9, 1932	Week ended Jan. 7, 1933	Week ended Jan. 9, 1932	Week ended Jan. 7, 1933	Week ended Jan. 9, 1932	Week ended Jan. 7, 1933	Week ended Jan. 9, 1932
West South Central States:								
Arkansas	0	0	26	19	2	8	0	9
Louisiana	0	0	[illegible]	14	2	7	6	17
Oklahoma [4]	0	2	17	51	0	4	1	9
Texas [3]	0	1	70	111	5	10	9	14
Mountain States:								
Montana	0	0	13	51	5	5	1	0
Idaho	0	0	2	4	7	2	1	0
Wyoming	0	0	5	6	0	0	0	1
Colorado	0	1	60	58	0	4	2	0
New Mexico	0	1	19	18	0	0	1	1
Arizona	0	0	5	7	0	2	1	1
Utah [2]	0	0	22	10	0	3	0	0
Pacific States:								
Washington	1	0	20	56	13	31	1	3
Oregon	0	0	29	19	2	17	3	3
California	3	3	159	111	9	16	11	4
Total	22	48	4,717	4,701	119	483	310	276

[1] New York City only.
[2] Week ended Friday.
[3] Typhus fever, week ended Jan. 7, 1933, 7 cases. 1 case in Virginia, 1 case in Florida, 4 cases in Alabama, and 1 case in Texas.
[4] Figures for 1933 are exclusive of Oklahoma City and Tulsa.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week:

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
November, 1932										
Colorado		38	808		23		2	183	4	11
Mississippi		137	12,759	1,918	81	215	7	130	3	21
Texas		796	322	710		2	1	399		35
Virginia	3	231	[1] 153	23	202	6	7	367	1	56
December, 1932										
Connecticut	1	44	112		83		1	365	10	4
Maine		13	329		6		2	129	0	25
Massachusetts	6	156	78	1	519		3	1,527	0	17
Michigan	7	133	382	5	1,339		2	1,530	6	37
Nebraska	4	117	1,342		29		2	211		1

[1] Incomplete.

November, 1932

	Cases
Chicken pox:	
Colorado	474
Mississippi	552
Virginia	199
Dengue:	
Mississippi	4
Dysentery:	
Mississippi (amebic)	24
Dysentery and diarrhea:	
Virginia	65
Hookworm disease:	
Mississippi	162
Impetigo contagiosa:	
Colorado	1
Jaundice, infectious:	
Virginia	1
Mumps:	
Colorado	104
Mississippi	90
Ophthalmia neonatorum:	
Virginia	1
Paratyphoid fever:	
Colorado	1
Texas	1
Virginia	1
Puerperal septicemia:	
Mississippi	22
Rabies in animals:	
Mississippi	10
Septic sore throat:	
Virginia	4
Tetanus:	
Virginia	1
Trachoma:	
Mississippi	3
Virginia	1
Tularaemia:	Cases
Colorado	1
Virginia	11
Undulant fever:	
Virginia	3
Vincent's angina:	
Colorado	4
Whooping cough:	
Colorado	24
Mississippi	362
Virginia	153

December, 1932

	Cases
Chicken pox:	
Connecticut	528
Maine	376
Massachusetts	1,700
Michigan	2,315
Nebraska	337
Conjunctivitis, infectious:	
Connecticut	7
Dysentery:	
Connecticut (amebic)	1
Massachusetts	3
Michigan	1
German measles:	
Connecticut	6
Maine	10
Massachusetts	28
Lead poisoning:	
Connecticut	4
Massachusetts	6
Lethargic encephalitis:	
Maine	2
Massachusetts	2
Michigan	4
Mumps:	Cases
Connecticut	230
Maine	33
Massachusetts	528
Michigan	727
Nebraska	52
Ophthalmia neonatorum:	
Connecticut	2
Massachusetts	80
Paratyphoid fever:	
Connecticut	4
Rabies in animals:	
Connecticut	2
Septic sore throat:	
Connecticut	2
Maine	1
Massachusetts	22
Michigan	41
Nebraska	269
Tetanus:	
Massachusetts	1
Trichinosis:	
Connecticut	5
Tularaemia:	
Michigan	10
Undulant fever:	
Connecticut	2
Maine	1
Massachusetts	1
Michigan	3
Vincent's angina:	
Maine	7
Whooping cough:	
Connecticut	361
Maine	51
Massachusetts	669
Michigan	906
Nebraska	55

WEEKLY REPORTS FROM CITIES

City reports for week ended December 31, 1932

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	0	1	0	0	1	4	0	0	0	7	18
New Hampshire:											
Concord	0		0	0	0	0	0	0	0	0	12
Nashua	0		0	0	0	3	0	0	0	0	[illegible]
Vermont:											
Barre	0		0	0	0	0	0	0	0	0	2
Burlington	0		0	0	0	0	0	0	0	0	18
Massachusetts:											
Boston	10	26	3	34	35	97	0	12	2	53	240
Fall River	0	2	0	0	1	8	0	0	0	3	30
Springfield	1		0	0	1	9	0	2	0	4	31
Worcester	2		0	0	5	22	0	2	0	8	54
Rhode Island:											
Pawtucket	0		0	0	0	0	0	0	0	0	16
Providence	1	10	2	0	1	14	0	2	0	11	69
Connecticut:											
Bridgeport	1	16	0	15	6	10	0	0	0	0	34
Hartford	0	12	0	9	4	10	0	0	0	2	47
New Haven	1	6	1	0	4	3	0	1	0	5	42
New York:											
Buffalo	6		6	3	38	30	0	5	0	44	164
New York	48	649	51	287	351	163	0	79	4	96	1,809
Rochester	0	422	2	2	17	29	0	2	0	2	93
Syracuse	0		0	1	12	21	0	1	0	1	70

City reports for week ended December 31, 1932—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
New Jersey:											
Camden	0	4	3	1	7	8	0	1	0	0	43
Newark	2	122	1	62	5	18	0	5	0	11	64
Trenton	0	1	0	4	9	13	0	0	0	2	36
Pennsylvania:											
Philadelphia	7	31	11	27	38	137	0	22	1	3	516
Pittsburgh	8	33	14	4	31	45	0	7	0	0	175
Reading	1	------	0	17	3	1	0	1	0	2	21
Ohio:											
Cincinnati	1	3	14	0	33	16	0	9	1	3	194
Cleveland	7	378	12	2	31	67	0	16	0	9	261
Columbus	4	14	10	166	13	12	0	5	1	0	113
Toledo	1	13	9	17	11	35	0	10	0	1	106
Indiana:											
Fort Wayne	4	------	1	0	4	1	0	2	0	0	39
Indianapolis	4	------	2	8	20	6	0	2	0	0	------
South Bend	0	------	0	0	1	3	0	0	0	0	23
Terre Haute	1	------	1	1	8	2	0	0	0	0	35
Illinois:											
Chicago	14	38	21	34	91	175	0	37	0	16	803
Springfield	0	8	2	0	8	4	0	1	1	0	39
Michigan:											
Detroit	6	63	14	46	40	88	0	13	1	51	386
Flint	0	117	2	5	8	3	0	1	1	2	40
Grand Rapids	0	------	7	0	3	10	0	0	0	25	52
Wisconsin:											
Kenosha	0	1	0	0	0	3	1	0	0	6	4
Madison	1	27	------	3	------	0	0	------	0	0	------
Milwaukee	2	15	16	1	18	11	0	4	0	14	138
Racine	0	------	0	2	0	4	0	1	0	4	12
Superior	0	------	1	1	0	0	0	0	0	0	7
Minnesota:											
Duluth	0	------	1	0	4	2	0	1	0	2	28
Minneapolis	2	------	17	31	22	25	0	0	0	1	119
St. Paul	0	9	9	0	10	12	0	4	0	9	85
Iowa:											
Des Moines	5	------	------	0	------	6	0	------	0	0	60
Sioux City	0	------	------	0	------	0	0	------	0	1	------
Waterloo	------	------	------	------	------	------	------	------	------	------	------
Missouri:											
Kansas City	1	3	3	20	31	26	0	12	0	3	153
St. Joseph	1	------	0	1	11	0	0	3	0	0	48
St. Louis	14	18	9	0	20	24	0	18	1	1	330
North Dakota:											
Fargo	0	------	0	3	1	0	0	0	0	0	5
Grand Forks	0	------	0	8	0	0	0	0	0	0	------
South Dakota:											
Aberdeen	0	------	0	0	0	0	0	0	0	0	------
Sioux Falls	0	------	0	2	0	0	0	0	0	0	10
Nebraska:											
Omaha	7	------	0	1	16	7	1	1	0	0	68
Kansas:											
Topeka	1	3	0	10	10	1	0	0	0	0	40
Wichita	1	200	3	1	16	4	0	1	0	0	59
Delaware:											
Wilmington	2	------	0	2	5	1	0	2	0	1	33
Maryland:											
Baltimore	3	648	7	3	38	58	0	11	2	13	255
Cumberland	0	2	1	0	2	0	0	0	0	0	19
Frederick	0	5	0	0	0	0	0	0	0	0	5
District of Columbia:											
Washington	4	74	6	4	41	9	0	16	0	4	102
Virginia:											
Lynchburg	2	------	2	0	1	0	0	0	0	1	15
Norfolk	1	27	0	0	4	0	0	0	0	0	27
Richmond	0	54	10	1	7	6	0	4	0	0	69
Roanoke	1	------	1	3	6	8	0	2	0	0	22
West Virginia:											
Charleston	0	3	1	0	3	2	0	0	0	0	14
Huntington	1	------	------	12	------	1	1	------	0	0	------
Wheeling	0	------	0	114	1	3	0	1	0	7	20
North Carolina:											
Raleigh	0	------	0	1	4	0	0	1	0	0	25
Wilmington	0	------	0	0	2	1	0	0	0	0	17
Winston-Salem	0	13	0	1	5	2	0	0	0	0	19

City reports for week ended December 31, 1932—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
South Carolina:											
Charleston	0	160	3	0	1	1	0	3	0	1	32
Columbia	0		0	0	6	0	0	1	0	0	33
Georgia:											
Atlanta	1	311	17	2	14	3	0	1	0	2	95
Brunswick	0		0	0	0	0	0	0	0	0	2
Savannah	2	84	3	0	6	0	0	2	0	1	58
Florida:											
Miami	0	15	0	0	0	0	0	0	0	0	22
Tampa	3	3	3	0	2	1	0	2	0	0	28
Kentucky:											
Lexington	0	41	5	0	7	2	0	0	0	0	31
Louisville	3	24	6	0	12	9	0	1	0	0	104
Tennessee:											
Memphis	0		11	0	12	5	0	9	4	2	115
Nashville	0		15	1	13	3	0	3	0	0	79
Alabama:											
Birmingham	4	126	10	0	6	4	0	6	0	0	80
Mobile	1	4	3	0	3	0	0	2	0	0	27
Montgomery	1	3		0		0	0		0	0	
Arkansas:											
Fort Smith	0	1,000		0		0	0		0	0	
Little Rock	3	76	0	0	11	0	0	0	0	0	12
Louisiana:											
New Orleans	0	61	18	0	9	5	0	5	0	0	152
Shreveport	0	3	2	1	8	1	1	2	0	0	43
Oklahoma:											
Muskogee	0	42		0		0	1		0	0	
Tulsa	0		0	1	0	0	1	0	0	0	
Texas:											
Dallas	6	124	21	2	14	5	0	5	1	1	78
Fort Worth	5		13	0	11	12	0	0	0	0	
Galveston	4		0	1	3	2	0	0	0	0	12
Houston	6		3	1	18	4	0	3	0	0	62
San Antonio	9	1	17	0	9	0	0	8	0	0	84
Montana:											
Billings	0		0	0	0	0	0	0	0	0	8
Great Falls	0		0	115	1	1	0	0	0	1	4
Helena	0	204	0	0	0	0	0	0	0	0	9
Missoula	0	303	0	0	0	0	0	0	0	0	1
Idaho:											
Boise	0		0	3	0	3	6	0	0	0	7
Colorado:											
Denver	2	82	7	4	28	14	0	5	0	1	93
Pueblo	0		2	0	1	1	0	0	0	0	8
New Mexico:											
Albuquerque	5		0	0	2	3	0	1	0	5	9
Arizona:											
Phoenix	0		0	0	1	0	0	4	0	0	
Utah:											
Salt Lake City	1		3	0	6	5	0	0	0	1	38
Nevada:											
Reno	0		0	0	2	0	0	0	0	0	5
Washington:											
Seattle	0			0		2	0		0	8	
Spokane	0			0		0	0		0	0	
Tacoma	0		1	0	1	4	2	0	0	0	35
Oregon:											
Portland	0	198	4	1	14	5	1	2	0	0	92
Salem	0	92		1		0	0		0	0	
California:											
Los Angeles	15	169	8	57	28	34	6	29	1	31	302
Sacramento	2	32	0	1	11	1	0	4	0	4	39
San Francisco	1	555	18	0	18	3	0	7	1	9	220

City reports for week ended December 31, 1932—Continued

State and city	Meningococcus meningitis		Poliomyelitis, cases	State and city	Meningococcus meningitis		Poliomyelitis, cases
	Cases	Deaths			Cases	Deaths	
New York:				Maryland:			
New York	1	0	3	Baltimore	1	0	0
Pennsylvania:				District of Columbia:			
Philadelphia	0	0	1	Washington	1	0	0
Pittsburgh	1	1	0	Georgia:			
				Atlanta	4	0	0
Ohio:							
Cleveland	0	1	0	Kentucky:			
Indiana:				Lexington	2	2	0
Indianapolis	2	1	0	Tennessee:			
Illinois:				Memphis	1	0	0
Chicago	18	12	0				
Springfield	0	1	0	Louisiana:			
Michigan:				New Orleans	2	2	0
Detroit	1	0	0				
				New Mexico:			
Minnesota:				Albuquerque	1	1	0
Minneapolis	1	0	1				
St. Paul	0	0	1	Washington:			
Missouri:				Seattle	1	0	1
St. Joseph	1	1	0	Tacoma	1	0	0
St. Louis	2	1	0	California:			
Nebraska:				Los Angeles	2	3	0
Omaha	1	0	0	San Francisco	1	0	0
Kansas:							
Wichita	1	0	0				

Lethargic encephalitis.—Cases: New York, 1; Cleveland, 1; Toledo, 1; Chicago, 1; Detroit, 1; Minneapolis, 1.

Pellagra.—Cases: Baltimore, 1; Raleigh, 1; Winston-Salem, 2; Atlanta, 2; Savannah, 2, Birmingham, 1; New Orleans, 1.

Typhus fever.—Cases: Savannah, 2.

FOREIGN AND INSULAR

INFLUENZA IN GREAT BRITAIN

During the month of December, 1932, there was an increase in the number of deaths from respiratory diseases in the 16 principal towns of Scotland and especially in the city of Glasgow. The following table shows the death rates for the four weeks ended December 24, 1932, in these towns and in Glasgow. The figures are taken from the Weekly Return of Births, Deaths, and Marriages, issued by the Registrar General of Scotland.

Deaths in principal towns of Scotland

	Week ended—				
	Dec. 3, 1932	Dec. 10, 1932	Dec. 17, 1932	Dec. 24, 1932	Dec. 26, 1931
Deaths, all causes, per 1,000 population:					
16 principal towns	13.3	15.5	16.7	21.1	13.7
Glasgow	14.3	18.0	19.8	28.4	14.0
Number of deaths from influenza:					
16 principal towns	12	12	32	112	6
Glasgow	8	7	28	80	3
Number of deaths from respiratory diseases except tuberculosis:					
16 principal towns	124	150	220	291	161
Glasgow	65	86	143	206	38

The Registrar General of England and Wales reports deaths in 118 great towns for the four weeks ended December 24, 1932, as follows:

Deaths in 118 great towns of England and Wales

	Week ended—				
	Dec. 3, 1932	Dec. 10, 1932	Dec. 17, 1932	Dec. 24, 1932	Dec. 26, 1931 [1]
Deaths, all causes, per 1,000 population:					
118 great towns	11.5	12.1	13.2	13.1	12.8
London	11.1	12.0	13.4	12.2	12.0
Number of deaths from influenza:					
118 great towns	33	68	85	120	----------
London	6	6	12	8	----------

[1] 107 great towns.

CANADA

Provinces—Communicable diseases—Week ended December 24, 1932.—The Department of Pensions and National Health of Canada reports cases of certain communicable diseases for the week ended December 24, 1932, as follows:

Disease	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis						1			1
Chicken pox	17		145	261	63	28		16	530
Diphtheria	1	7	26	23	7	1	1	1	67
Erysipelas			2	1				2	5
Influenza	15		150	112				910	1,187
Measles	11	30	24	531	2			1	599
Mumps				183	16	1		2	202
Pneumonia, all forms	1			7		6		2	16
Poliomyelitis			1						1
Scarlet fever	6	17	62	74	21	26	1	5	212
Smallpox						1			1
Trachoma								1	1
Tuberculosis	1	1	75	67	3	1	1	16	165
Typhoid fever		1	21	5	1	8			36
Undulant fever				1					1
Whooping cough			57	72	32	8		5	174

Quebec Province—Communicable diseases—Four weeks ended December 31, 1932.—The Bureau of Health of the Province of Quebec, Canada, reports cases of certain communicable diseases for the four weeks ended December 31, 1932, as follows:

Disease	Week ended—			
	Dec 10	Dec 17	Dec 24	Dec 31
Cerebrospinal meningitis		1		1
Chicken pox	111	115	145	82
Diphtheria	33	25	26	10
Erysipelas	3	4	2	1
German measles	4	4	4	1
Influenza		2	150	93
Measles	57	55	20	22
Ophthalmia neonatorum	1	1		
Poliomyelitis		1	1	
Puerperal fever	1	1		1
Scarlet fever	84	61	62	16
Tuberculosis	88	38	75	58
Typhoid fever	18	8	21	
Whooping cough	77	114	57	41

CUBA

Habana—Communicable diseases—Four weeks ended December 31, 1932.—During the four weeks ended December 31, 1932, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chicken pox	2		Scarlet fever	2	
Diphtheria	13	5	Tuberculosis	5	
Malaria	21	5	Typhoid fever	8	1

PANAMA CANAL ZONE

Communicable diseases—November, 1932.—During the month of November, 1932, certain communicable diseases, including imported cases, were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chicken pox	10		Meningococcus meningitis	1	
Diphtheria	10	1	Pneumonia		13
Dysentery, amebic	3	2	Tuberculosis		20
Dysentery, bacillary	4		Typhoid fever	1	1
Malaria	123	2	Whooping cough	3	
Measles	40	1			

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

(NOTE.—A table giving current information of the world prevalence of the quarantinable diseases appeared in the Public Health Reports for December 30, 1932, pp. 2382–2391. A similar cumulative table will appear in the Public Health Reports to be issued January 27, 1933, and thereafter, at least for the time being, in the issue published on the last Friday of each month.)

Cholera

Philippine Islands.—During the week ended January 7, 1933, 43 cases of cholera with 23 deaths were reported in Leyte Province, P. I., and 60 cases with 43 deaths were reported in Samar Province.

Smallpox

China—Canton.—During the two weeks ended January 7, 1933, 419 cases of smallpox with 12 deaths were reported at Canton, China

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UNITED STATES TREASURY DEPARTMENT

PUBLIC HEALTH REPORTS

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UNITED STATES PUBLIC HEALTH SERVICE

HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst. Surg. Gen. R. C. WILLIAMS, *Chief of Division*

The PUBLIC HEALTH REPORTS are issued weekly by the United States Public Health Service through its Division of Sanitary Reports and Statistics, pursuant to acts of Congress approved February 15, 1893, and August 14, 1912.

They contain: (1) Current information of the prevalence and geographic distribution of preventable diseases in the United States in so far as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other communicable diseases throughout the world. (2) Articles relating to the cause, prevention, or control of disease. (3) Other pertinent information regarding sanitation and the conservation of the public health.

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④ PUBLIC HEALTH REPORTS

VOL. 48 JANUARY 27, 1933 NO. 4

RAT INFESTATION OF SHIPS OUT OF COMMISSION

By C. L. WILLIAMS, *Senior Surgeon, United States Public Health Service*

During the past few months, 97 ships that have been out of commission and tied up at the port of New York, for periods varying from 4 months to 12 years, have been inspected for rat infestation.

Almost without exception, these ships are tied up in groups, several ships abreast. All but one of the groups are at piers, the largest group, of 65 ships, is anchored close to the western shore of Staten Island and has contact with the land practically at only one point. Of the three groups at piers, two groups, totaling 24 vessels, are at unused piers, while the third group of 8 vessels, is at one of the large shipyards. The ships in this latter group have individual caretakers, but in each of the others a small crew residing on one vessel looks after all ships of the group.

All of these vessels have been inspected by rat-infestation inspectors of the New York Quarantine Station. The inspectors detailed to this duty are thoroughly competent to determine accurately whether there exists rat life on vessels or whether it is totally absent. Furthermore, their estimates of numbers of rats may, in the light of several years' experience, be taken, in the aggregate, to be not over 20 per cent from actual figures.

Of the 97 ships, 11, or 11.3 per cent, were found to be rat-infested, and 86 to be rat-free. Infested ships were distributed among the different groups—4 in the largest group, 2 each in two other groups, and 3 in the group at the shipyard. The highest estimate on any of the infested vessels was 18 rats; the average was 6.7 rats. The proportion infested is about half of the proportion (21.5 per cent) of ships found infested in active service inspected at the New York Quarantine Station during the fiscal year ended June 30, 1932.

Records were available of the infestation status of 64 ships approximately at the time when they were laid up. Of 21 that were infested when laid up, 4 were found to be infested on this inspection, while of 43 that were not infested when laid up, 7 were found to be infested.

As regards 33 vessels, there is no record as to their infestation status when laid up. Most of these had been laid up two years or more. Rat infestation was absent on all.

Of the 97 ships, 60 had been out of commission for a year or more, as follows: 16 ships one to two years, 14 ships two to four years, and 30 ships over four years. Of those more than four years out of commission, none were found infested, but 2 ships in each of the other two divisions were infested. On 2 of these, the estimate was 2 rats each; the other 2 vessels are of special interest. Both were heavily and persistently rat-infested for years, and both exhibited extensive rat harborage. One was fumigated just before being tied up, yielding 16 rats; on this inspection, 14 months later, the estimate was 16 rats. The other was trapped and fumigated about one year after being laid up, with the recovery of 73 rats. The present inspection, two years subsequent to the fumigation, shows evidence for an estimate of 12 rats. When this latter ship was fumigated, it was particularly noted that no young rats were recovered.

Summary of rat-infestation inspection on ships out of commission and laid up 4 months to 12 years

Number of ships	Number found infested	Per cent infested	Total number of rats	Rats per infested ship	Ships infested when laid up: Number of ships	Ships infested when laid up: Number infested at time of inspection	Ships infested when laid up: Per cent infested at time of inspection	Ships not infested when laid up: Number of ships	Ships not infested when laid up: Number infested at time of inspection	Ships not infested when laid up: Per cent infested at time of inspection	Ships laid up— 4 months to 1 year: Number of ships	4 months to 1 year: Number infested	1 to 2 years: Number of ships	1 to 2 years: Number infested	2 to 4 years: Number of ships	2 to 4 years: Number infested	4 years +: Number of ships	4 years +: Number infested
97	11	11.3	72	6.7	21	4	19	43	7	16.3	37	7	16	2	14	2	30	0

From this limited survey it would appear that rat colonies do not increase on ships laid up over considerable periods, and that invasion by rats from shore takes place only to a limited extent, but that rats already on board may remain and exist for two or three years. The failure of colonies to increase is probably due to restriction of their food supply, so that the results of this survey should not be applied unreservedly to ships on which any considerable amount of food is maintained accessible to rats.

COURT DECISION RELATING TO PUBLIC HEALTH

Liability of city for water-borne typhoid fever.—(Montana Supreme Court; Campbell *v.* City of Helena, 16 P. (2d) 1; decided July 20, 1932.) An action to recover damages was brought against the city of Helena, the plaintiff claiming that he had contracted typhoid fever as a result of drinking contaminated water furnished by the city. The

lower court dismissed the action, giving judgment on the pleadings in favor of the city. On appeal to the supreme court, three of the questions presented for determination were as set forth below.

One question was whether the city, in operating a municipally owned water system, acted in a governmental or in a proprietary capacity. The court, in holding that the city's operation of the water system was a proprietary function, referred to some of its own prior decisions in which this stand was enunciated and stated that it had no inclination to depart from a principle so long and firmly established.

Another question was whether the laws creating a State board of health and subordinate county and city health departments took the control of the water system out of the hands of the city so as to relieve it of the duty of maintaining a pure supply of water. After reviewing the statutes and pointing out that all of the powers, duties, and authority vested in the health officials pertained with the same force when a water system was owned and operated by a private person or corporation as when it was municipally owned and operated, the supreme court said:

If, then, the reposing of power in the health officers to protect the public health in the manner designated relieves a city of liability for negligently and knowingly furnishing polluted water to its customers, all private enterprises performing a like service are likewise relieved. This can not be. The city furnishes water to its inhabitants in its private corporate capacity, and it stands exactly in the shoes of the old Helena Water Co. from which it purchased the plant; its activity in supplying water for domestic purposes for hire carries with it the duty to exercise care commensurate with the risk involved to see that the water which it supplies is free from filth and germs which will affect the health of its customers, just as is a private operator of a water system.

The third question was whether under section 5080, Revised Codes 1921, the plaintiff should have notified the city concerning his injury as a condition precedent to the maintenance of an action for damages. Said section 5080 provided as follows:

Before any city or town in this State shall be liable for damages for or on account of any injury or loss alleged to have been received or suffered by reason of any defect in any bridge, street, road, sidewalk, culvert, park, public grounds, ferryboat, or public works of any kind in said city or town, the person so alleged to be injured, or some one in his behalf, shall give to the city or town council, or trustee, or other governing body of such city or town, within 60 days after the alleged injury, notice thereof; said notice to contain the time when and the place where said injury is alleged to have occurred.

The court held that under this law there was no requirement imposed upon the plaintiff to give notice to the city, saying:

In construing a statute the court must give effect to every word, phrase, clause, or sentence therein if it is possible to do so. [Cases cited] With this rule in mind, the statute before us, read in the light of its title, precludes the idea that its maker intended that notice should be given in such a case as this; the

wording of the statute in its entirety clearly indicates the intention that the act relates to actions based upon personal injury received by reason of an accident caused by a defect in a street or other "public place" or "works" to which the general public had the right of access, and, consequently, which the city was in duty bound to use reasonable care to keep in a reasonably safe condition of repair for the protection of those who rightfully traveled the way or went upon the grounds.

The judgment of the lower court in favor of the city was reversed.

DEATHS DURING WEEK ENDED JANUARY 7, 1933

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Jan. 7, 1933	Corresponding week, 1932
Data from 85 large cities of the United States:		
Total deaths	9,730	9,113
Deaths per 1,000 population, annual basis	13.6	13.0
Deaths under 1 year of age	608	633
Deaths under 1 year of age per 1,000 estimated live births [1]	57	54
Data from industrial insurance companies:		
Policies in force	69,164,524	74,255,910
Number of death claims	11,377	13,082
Death claims per 1,000 policies in force, annual rate	8.6	9.2

[1] 1932, 81 cities; 1931, 78 cities.

DEATHS DURING 52-WEEK PERIOD ENDED DECEMBER 31, 1932

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	52 weeks ended Dec. 31, 1932	Calendar year, 1931
Data from 85 large cities of the United States:		
Total deaths	409,016	423,002
Deaths per 1,000 population, annual basis	11.2	11.8
Deaths under 1 year of age	31,879	37,169
Deaths under 1 year of age per 1,000 live births [1]	[2] 53	59

[1] Infant mortality rate for cities under consideration which are in the birth registration area.
[2] Provisional.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended January 14, 1933, and January 16, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended January 14, 1933, and January 16, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Jan. 14, 1933	Week ended Jan. 16, 1932	Week ended Jan. 14, 1933	Week ended Jan. 16, 1932	Week ended Jan. 14, 1933	Week ended Jan. 16, 1932	Week ended Jan. 14, 1933	Week ended Jan. 16, 1932
New England States:								
Maine	1	5	1,341	51		541	0	0
New Hampshire		2		1		15	0	0
Vermont	3					205	0	0
Massachusetts	22	60	263	35	140	450	0	3
Rhode Island	4	8	79		1	789	0	0
Connecticut	5	7	471	6	100	122	0	2
Middle Atlantic States:								
New York	69	172	[1] 533	[1] 28	1,160	1,048	11	10
New Jersey	30	32	444	16	308	60	1	1
Pennsylvania	111	128			360	93	2	6
East North Central States:								
Ohio	62	99	870	44	559	374	3	1
Indiana	46	107	452	47	16	53	4	11
Illinois	86	134	245	67	77	63	9	4
Michigan	23	49	173	1	378	140	5	4
Wisconsin	10	30	4,043	21	158	261	3	1
West North Central States:								
Minnesota	6	17	88	4	224	22	2	1
Iowa	22	18	1,208			3	5	0
Missouri	46	43	104	4	79	15	4	0
North Dakota	8	1	2,470		65	42	0	0
South Dakota	12	12	148	4	5	61	0	0
Nebraska	14	13	210		9	22	3	0
Kansas	10	48	2,027	2	25	28	2	2
South Atlantic States:								
Delaware	11	6	13	2	2	1	0	0
Maryland [2]	15	46	1,235	43	6	16	2	0
District of Columbia	10	19	11		7	1	1	0
Virginia	22				176		5	2
West Virginia	12	38	2,094	18	228	379	1	0
North Carolina	17	49	1,193	23	144	115	1	4
South Carolina [3]	10	15	3,016	431	20	59	0	0
Georgia [3]	12	9	1,507	57	4	2	0	1
Florida	9	29	84	3	4	10	0	0
East South Central States:								
Kentucky	34	55	4,134	127		59	3	0
Tennessee	23	43	1,630	81	9	22	4	5
Alabama [3]	30	48	1,119	42	4	2	5	1
Mississippi	10	23					0	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended January 14, 1933, and January 16, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Jan. 14, 1933	Week ended Jan. 16, 1932	Week ended Jan. 14, 1933	Week ended Jan. 16, 1932	Week ended Jan. 14, 1933	Week ended Jan. 16, 1932	Week ended Jan. 14, 1933	Week ended Jan. 16, 1932
West South Central States:								
Arkansas	13	15	1, 187	7	6	5	0	0
Louisiana	22	29	560	14	2	5	2	2
Oklahoma [4]	21	66	1, 110	71		22	3	0
Texas [1]	108	134	3, 054	46	513	2	1	1
Mountain States:								
Montana	6	2	2, 250	2	191	117	0	1
Idaho		1	3		6	1	0	1
Wyoming	2	1			20	3	0	0
Colorado	11	8	108		10	7	0	2
New Mexico	12	21	4	5	3	4	0	0
Arizona	3	8	51	17		5	0	1
Utah [2]	2	1	5				0	0
Pacific States:								
Washington	4	3	58		3	223	0	2
Oregon	3	2	527	58	25	13	0	0
California	61	80	756	177	108	250	5	3
Total	1, 082	1, 745	42, 084	1, 558	5, 188	5, 730	87	72

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Jan. 14, 1933	Week ended Jan. 16, 1932	Week ended Jan. 14, 1933	Week ended Jan. 16, 1932	Week ended Jan. 14, 1933	Week ended Jan. 16, 1932	Week ended Jan. 14, 1933	Week ended Jan. 16, 1932
New England States:								
Maine	0	1	45	20	0	0	0	2
New Hampshire	0	0	26	13	0	0	0	0
Vermont	0	0	17	2	0	12	0	0
Massachusetts	0	2	416	495	0	17	3	5
Rhode Island	0	0	41	42	0	0	0	0
Connecticut	0	0	114	70	1	8	1	0
Middle Atlantic States:								
New York	0	5	747	803	0	4	7	17
New Jersey	1	0	265	238	0	0	1	1
Pennsylvania	2	3	504	565	0	0	6	12
East North Central States:								
Ohio	1	2	682	577	7	35	4	8
Indiana	0	2	108	124	2	14	1	3
Illinois	1	6	488	286	12	21	2	14
Michigan	0	1	408	313	0	5	3	3
Wisconsin	0	1	101	83	4	6	0	2
West North Central States:								
Minnesota	0	0	94	94	2	6	0	0
Iowa	0	0	30	46	16	41	0	0
Missouri	0	0	118	75	0	10	2	2
North Dakota	0	0	3	10	1	4	0	1
South Dakota	0	0	19	10	0	21	32	2
Nebraska	0	0	22	27	2	5	0	0
Kansas	0	0	73	72	1	2	1	8
South Atlantic States:								
Delaware	0	0	15	3	0	0	0	0
Maryland [3]	1	0	101	105	0	0	1	4
District of Columbia	0	0	21	23	0	0	0	2
Virginia	0		66		0		1	
West Virginia	0	0	47	48	0	2	3	14
North Carolina	0	6	65	85	2	1	1	10
South Carolina [3]	0	1	8	9	1	0	2	15
Georgia [3]	0	0	17	10	0	0	8	8
Florida	0	0	8	10	0	0	4	5
East South Central States:								
Kentucky	3	2	35	157	0	4	3	23
Tennessee	0	0	44	73	2	12	6	14
Alabama [3]	1	0	22	30	2	157	8	21
Mississippi	0	0	7	28	2	16	0	4

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended January 14, 1933, and January 16, 1932 — Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Jan. 14, 1933	Week ended Jan. 16, 1932	Week ended Jan. 14, 1933	Week ended Jan. 16, 1932	Week ended Jan. 14, 1933	Week ended Jan. 16, 1932	Week ended Jan. 14, 1933	Week ended Jan. 16, 1932
West South Central States								
Arkansas	0	1	9	13	12	33	1	6
Louisiana	0	0	16	26	5	7	5	10
Oklahoma [4]	1	1	49	65	2	10	4	7
Texas [3]	0	1	113	62	15	28	8	5
Mountain States:								
Montana	0	0	16	22	0	2	0	2
Idaho	0	0	7	6	4	3	1	1
Wyoming	0	0	18	7	1	0	0	0
Colorado	0	0	23	47	0	2	1	1
New Mexico	0	1	14	10	0	1	3	4
Arizona	0	0	10	12	1	1	0	0
Utah [2]	0	0	14	8	1	0	0	1
Pacific States:								
Washington	1	0	28	44	5	17	3	1
Oregon	0	0	16	24	1	31	0	2
California	1	2	174	158	21	12	6	2
Total	13	38	5,374	5,255	128	550	127	237

[1] New York City only.
[2] Week ended Friday.
[3] Typhus fever, week ended Jan. 14, 1933, 20 cases; 1 case in South Carolina, 8 cases in Georgia, 4 cases in Alabama, and 7 cases in Texas.
[4] Figures for 1933 are exclusive of Oklahoma City and Tulsa.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week:

State	Cerebrospinal meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
December, 1932										
Arizona	8	19	1,389	3	1		0	75	0	3
Florida	1	80	183	26	3	5	2	36	0	9
Georgia	9	121	10,021	600	20	27	4	87	0	25
Indiana	14	388	5,118		81		0	571	29	23
Iowa	4	90	3,833		9		2	184	155	3
New Jersey	8	133	411		918		6	944	0	17
North Dakota	3	36	4,798		385		2	50	9	
Tennessee	7	103	13,762	42	29	11	5	259	24	41
Vermont		9			7		0	86	1	1
Wyoming		1	610		39		1	24	0	1

December, 1932

	Cases
Chicken pox:	
Arizona	74
Florida	50
Georgia	176
Indiana	691
Iowa	452
New Jersey	1,700
North Dakota	104
Tennessee	339
Vermont	307
Wyoming	17
Dengue:	
Georgia	1
Dysentery:	
Florida	1
Georgia	8
Tennessee	8
German measles:	
Arizona	1
Indiana	3
Iowa	1
New Jersey	30
Tennessee	9
Impetigo contagiosa:	
Iowa	4
Tennessee	11
Lead poisoning:	
New Jersey	6
Lethargic encephalitis:	
Arizona	1
Indiana	1
New Jersey	1
Mumps:	
Arizona	31
Florida	1
Georgia	49
Mumps—Continued.	
Indiana	62
Iowa	85
New Jersey	522
North Dakota	5
Tennessee	99
Vermont	216
Ophthalmia neonatorum:	
New Jersey	3
Tennessee	1
Paratyphoid fever:	
Georgia	1
New Jersey	2
Puerperal septicemia:	
Tennessee	8
Rabies in animals:	
New Jersey	14
Scabies:	
Tennessee	24

Septic sore throat:	
Georgia	24
Iowa	1
Tennessee	8
Tetanus:	
Tennessee	2
Trachoma:	
Arizona	10
New Jersey	3
North Dakota	3
Tennessee	25
Trichinosis:	
New Jersey	9
Tularaemia:	
Arizona	1
Florida	1
Tularaemia—Continued.	
Indiana	
Iowa	
Tennessee	
Wyoming	
Typhus fever:	
Florida	
Georgia	
Undulant fever:	
Georgia	
Indiana	
Iowa	
Vermont	
Vincent's angina:	
Indiana	
Tennessee	
Vincent's infection:	
North Dakota	17
Whooping cough:	
Arizona	2
Florida	5
Georgia	71
Indiana	78
Iowa	[illegible]
New Jersey	362
North Dakota	21
Tennessee	[illegible]
Vermont	98
Wyoming	20

WEEKLY REPORTS FROM CITIES

City reports for week ended January 7, 1933

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Maine:											
Portland	0	20	1	0	3	5	0	0	0	16	25
New Hampshire:											
Concord	0		2	0	0	0	0	1	0	0	16
Nashua	0		0	0	0	0	0	0	0	0	
Vermont:											
Barre	0		0	0	1	0	0	1	0	0	7
Massachusetts:											
Boston	0	58	4	42	35	77	0	10	0	34	228
Fall River	3	1	1	0	0	8	0	2	0	5	32
Springfield	1	1	0	5	1	6	0	1	0	5	31
Worcester	0		0	1	1	12	0	2	1	15	87
Rhode Island:											
Pawtucket	0		0	0	0	0	0	0	0	0	14
Providence	1	7	0	0	6	15	0	0	0	6	61
Connecticut:											
Bridgeport	3	7	3	16	6	13	0	0	0	0	36
Hartford	0	11	0	1	4	4	0	4	0	3	39
New Haven	2	2	1	0	2	8	0	0	0	14	32
New York:											
Buffalo	2	20	3	0	32	45	0	12	0	45	179
New York	53	701	102	317	306	182	0	105	5	107	1,909
Rochester	0	167	6	0	19	20	0	2	0	1	122
Syracuse	1	50	0	7	7	21	0	2	0	0	69
New Jersey:											
Camden	2	3	2	0	8	12	0	0	0	0	43
Newark	1	184	4	95	11	10	0	11	0	11	119
Trenton	0	3	1	0	6	20	0	5	0	3	53
Pennsylvania:											
Philadelphia	4	43	9	27	53	124	0	32	1	6	503
Pittsburgh	10	22	15	1	20	31	0	6	0	14	192
Reading	1		0	25	0	10	0	3	0	3	24
Scranton	8			2		13	0		0	2	
Ohio:											
Cincinnati	1	5	22	0	18	10	0	8	0	2	162
Cleveland	10	200	12	3	30	96	0	10	0	20	232
Columbus	8	45	7	141	9	15	0	4	0	0	105
Toledo	1	5	4	91	7	34	0	3	0	4	70
Indiana:											
Fort Wayne	10		2	0	3	0	0	1	2	2	21
Indianapolis	4		5	3	10	8	0	10	0	4	
South Bend	0		0	0	5	8	0	1	0	3	35
Terre Haute	0		4	0	4	4	0	1	0	0	30
Illinois:											
Chicago	17	24	17	65	53	224	0	37	0	26	731
Springfield	5	2	3	0	15	12	0	0	0	0	
Michigan:											
Detroit	8	29	23	80	47	106	0	25	0	78	339
Flint	2	117	0	0	11	5	0	0	1	4	34
Grand Rapids	0		6	0	8	8	0	0	0	31	38
Wisconsin:											
Kenosha	0	1	2	0	0	2	3	0	0	10	10
Madison	0	10		5		1	0		0	2	
Milwaukee	2	23	11	2	22	19	0	3	0	16	143
Racine	8		0	0	2	2	0	1	0	3	14
Superior	0		0	0	3	0	0	0	0	3	16

City reports for week ended January 7, 1933 —Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Minnesota:											
Duluth	0		3	0	3	4	0	0	0	8	28
Minneapolis	2	15	12	151	19	17	0	4	0	8	102
St. Paul	0	8	8	2	9	18	0	4	0	23	71
Iowa:											
Des Moines	13			0		2	0		0	0	31
Sioux City	0			1		0	0		0	0	
Waterloo	0			1		1	0		0	1	
Missouri:											
Kansas City	1	5	5	20	15	32	0	3	0	0	117
St. Joseph	0		1	0	2	2	0	0	0	0	9
St. Louis	26	4	0	2	16	28	0	3	1	3	239
North Dakota:											
Fargo	0		0	2	3	0	0	0	0	0	9
Grand Forks	0		0	7	0	0	0	0	0	0	
South Dakota:											
Aberdeen	0			3		1	0		0	0	
Nebraska:											
Omaha	6		0	0	25	7	1	1	0	0	81
Kansas:											
Topeka	0		1	13	3	0	0	1	0	0	11
Wichita	2		4	0	18	1	0	2	0	0	04
Delaware:											
Wilmington	1		0	0	5	2	0	0	0	3	32
Maryland:											
Baltimore	7	481	16	0	47	54	0	18	3	13	206
Cumberland	0	1	0	0	2	0	0	0	0	0	14
Frederick	0		0	0	1	0	0	0	0	0	5
District of Col.:											
Washington	5	21	8	2	30	14	0	11	0	6	205
Virginia:											
Lynchburg	1		2	0	4	2	0	0	0	6	13
Norfolk	1	26	0	0	3	1	0	1	0	0	41
Richmond	1	13	9	0	5	10	0	5	0	0	04
Roanoke	0		3	7	6	0	0	1	0	0	28
West Virginia:											
Charleston											
Huntington	1			4		0	0		0	0	
Wheeling	0		2	137	1	4	0	1	0	3	21
North Carolina:											
Raleigh	0	61	0	0	7	0	0	0	0	0	20
Wilmington	0	2	0	0	1	0	0	0	0	0	9
Winston-Salem	1	114	2	0	1	1	0	0	0	0	13
South Carolina:											
Charleston	0	263	2	0	4	0	0	4	0	0	30
Columbia	0		0	0	0	0	0	0	0	0	
Greenville	0		0	0	0	0	0	0	0	0	
Georgia:											
Atlanta	2	114	6	0	18	2	0	5	1	6	101
Brunswick	0		0	0	0	0	0	0	0	0	2
Savannah	1	125	4	0	3	4	0	2	0	0	32
Florida:											
Miami	0	14	0	1	5	0	0	0	0	0	33
Tampa	1	3	3	0	0	0	0	1	0	0	22
Kentucky:											
Ashland	0	22	0	1	0	2	0	0	0	0	
Lexington	1	15	1	0	3	0	0	2	0	0	17
Louisville	5	25	5	0	10	7	0	1	0	0	72
Tennessee:											
Memphis	3		6	0	13	5	0	8	1	3	88
Nashville	0		13	1	8	1	0	4	0	3	70
Alabama:											
Birmingham	2	167	3	0	5	4	0	5	0	2	69
Mobile	0		1	0	1	0	0	1	1	0	15
Montgomery	1	25		0		0	0		0	0	
Arkansas:											
Fort Smith	0			0		2	0		0	0	
Little Rock	0		2	0	12	0	0	1	0	0	15
Louisiana:											
New Orleans	10	113	14	0	12	5	0	10	1	2	150
Shreveport	1		1	0	17	1	0	3	0	0	60
Oklahoma:											
Tulsa	2			0		4	0		0	2	

City reports for week ended January 7, 1933 —Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Texas:											
Dallas	12	48	22	2	12	7	0	3	0	0	94
Fort Worth	5	----	10	1	8	7	0	0	0	0	52
Galveston	1	----	0	1	5	7	0	0	0	0	12
Houston	12	----	3	3	17	6	0	3	0	0	92
San Antonio	2	----	11	0	9	2	0	4	0	0	72
Montana:											
Billings	0	----	0	0	0	0	0	0	0	0	8
Great Falls	0	----	0	54	5	1	0	0	0	0	11
Helena	0	165	1	0	0	0	0	0	0	0	1
Missoula	0	150	0	0	1	0	0	1	0	0	13
Idaho:											
Boise	0	----	0	10	0	1	3	0	0	0	9
Colorado:											
Denver	1	119	6	4	19	12	0	2	0	1	80
Pueblo	0	----	2	0	6	3	0	0	0	3	14
New Mexico:											
Albuquerque	0	----	0	1	3	1	0	6	0	2	20
Arizona:											
Phoenix	0	----	----	0	----	2	0	----	0	0	----
Utah:											
Salt Lake City	0	----	3	0	1	0	0	1	0	3	19
Nevada:											
Reno	0	----	0	1	0	1	0	0	0		7
Washington:											
Seattle	0	----	----	0	----	0	0	----	0	2	----
Spokane	0	----	----	0	----	0	0	----	0	0	----
Tacoma	0	----	1	0	8	3	0	0	0	0	38
Oregon:											
Portland	0	64	12	0	12	1	2	0	0	0	86
Salem	0	24	----	3	----	0	0	----	0	0	----
California:											
Los Angeles	21	107	9	57	21	41	7	12	3	21	290
Sacramento	2	----	3	1	8	1	0	0	0	15	32
San Francisco	2	372	14	1	23	14	0	6	1	28	210

State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths	
Maine:			
Portland	0	0	2
New York:			
Buffalo	1	0	0
New York	3	3	1
New Jersey:			
Camden	0	1	0
Pennsylvania:			
Philadelphia	1	0	1
Pittsburgh	2	0	0
Ohio:			
Cincinnati	2	1	0
Illinois:			
Chicago	18	6	1
Michigan:			
Detroit	1	0	0
Wisconsin:			
Milwaukee	3	1	0
Minnesota:			
Minneapolis	1	0	1
Missouri:			
St. Joseph	1	0	0
St. Louis	1	0	0
Maryland:			
Baltimore	0	2	0
District of Columbia:			
Washington	2	0	0
South Carolina:			
Columbia	1	0	0
Kentucky:			
Louisville	2	0	0
Tennessee:			
Nashville	1	1	0
Louisiana:			
New Orleans	3	1	0
Washington:			
Spokane	1	----	0
Tacoma	0	1	1
California:			
Los Angeles	2	0	0
Sacramento	1	0	0
San Francisco	1	1	0

Lethargic encephalitis.—Cases: Buffalo, 1; New York, 1; Cleveland, 1; Detroit, 2; St. Paul, 1; Cumberland, 1.

Pellagra.—Cases: Charleston, S. C., 4; Atlanta, 1; Savannah, 1; Louisville, 1; Birmingham, 1; New Orleans, 1.

Typhus fever.—Cases: New York, 1; Richmond, 1; Charleston, S. C., 1; Savannah, 1.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Week ended December 31, 1932.—The Department of Pensions and National Health of Canada reports cases of certain communicable diseases for the week ended December 31, 1932, as follows:

Disease	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis			1						1
Chicken pox	16		82	210	13	51	6	42	420
Diphtheria	2	3	19	14	5	14	3	3	63
Erysipelas			1		1		1	4	7
Influenza	9		93	425		117		223	867
Measles	20	9	23	401			13	16	494
Mumps				113	3				116
Paratyphoid fever				1					1
Pneumonia				22		4		8	34
Scarlet fever	8	7	56	59	11	15	3	10	169
Trachoma								3	3
Tuberculosis	2	14	58	38	2	33		15	162
Typhoid fever				2	2	2			6
Undulant fever				1					1
Whooping cough			41	80	9	3		12	145

CUBA

Provinces—Communicable diseases—Four weeks ended December 10, 1932.—During the four weeks ended December 10, 1932, cases of certain communicable diseases were reported in the Provinces of Cuba, as follows:

Disease	Pinar del Rio	Habana	Matanzas	Santa Clara	Camaguey	Oriente	Total
Diphtheria	3	29	2	4	6	1	45
Leprosy		1				1	2
Malaria	188	22	114	706	120	52	1,202
Measles	1	9		15	19	11	55
Scarlet fever		7	1		1		9
Tuberculosis	6	20	7	21	11	9	74
Typhoid fever	10	11	3	22	1	6	53

DENMARK

Communicable diseases—July–September, 1932.—During the months of July, August, and September, 1932, cases of certain communicable diseases were reported in Denmark, as follows:

Disease	Cases			Disease	Cases		
	July	August	September		July	August	September
Cerebrospinal meningitis	2	9	0	Poliomyelitis	2	12	15
Chicken pox	10	10	5	Puerperal fever	10	14	15
Diphtheria and croup	155	177	321	Scabies	459	589	780
Erysipelas	205	261	321	Scarlet fever	142	172	242
German measles	5	5	2	Syphilis	45	85	59
Gonorrhea	912	1,065	995	Tetanus	5	3	5
Influenza	1,654	3,810	6,731	Typhoid fever	15	28	19
Lethargic encephalitis	3	12	8	Undulant fever (Bact. abort. Bang)	43	36	44
Measles	1,620	847	740	Whooping cough	2,236	2,186	1,770
Mumps	92	79	61				
Paratyphoid fever	129	198	221				

JAMAICA

Communicable diseases—Four weeks ended December 31, 1932.—During the four weeks ended December 31, 1932, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island of Jamaica, outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chicken pox	1	7	Leprosy		2
Diphtheria	2	2	Puerperal fever		5
Dysentery	2	2	Tuberculosis	32	86
Erysipelas		2	Typhoid fever	5	51

MEXICO

Tampico—Communicable diseases—December, 1932.—During the month of December, 1932, certain communicable diseases were reported in Tampico, Mexico, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	2	2	Paratyphoid fever	3	2
Enteritis, various	66	34	Tuberculosis		36
Influenza	303	14	Typhoid fever	5	2
Malaria	332	13	Whooping cough	24	

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Hygiene, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; D, deaths; P, present]

Place		June 23–July 23, 1932	July 24–Aug. 21, 1932	Aug. 21–Sept. 17, 1932	Week ended— Sept. 24, 1932	October, 1932 1	8	15	22	29	November, 1932 5	12	19	26	December, 1932 3	10	17	24	31	January, 1933 7	14
Baluchistan	C	18	53	1																	
	D	6	37	2																	
China:																					
Amoy	C	925	496	160	17	7	6	4													
	D	472	216	40	5	2	3	2													
Canton	C	835	22	22	5	8	2	2								1					
Hankow	C	39	584	209	1		3														
Hong Kong	C	115	88	25	1																
Kwantung Leased Territory—District of Port Arthur	C	P	2		1																
Macao	C		93	9	1																
	D	23	92	9	1																
Nanking	C	567	543	258		12															
Newchwang	C	5																			
Shanghai	C	1,329	1,048	546	21	11	3														
Swatow	C	84	238	43	2	10	12	6		3											
Tientsin	C	222	69	22		1															
Tsinan—Shantung Province	C			P																	
Tsingtao	C		10	38	4	2															
Chosen	C			17																	
India	C	4,272	6,270	6,312	1,390	893	551	756	785	482	543	601	648								
	D	2,155	3,423	3,477	789	483	384	416	473	259	258	526	494								
Bombay	C	2	3						3	1		1									
Calcutta	C	405	138	32	16	14	11	21	6	11	24	29	15	8	15	12	13	11			
Rangoon	C	1		1																	
India (French): Pondicherry Territory	C		3																		
Indo-China (see also table below):																					
Pnom-Penh	C		1	1	2		3												1		
Saigon and Cholon	C	1		1			1		1												
Japan:																					
Osaka Prefecture	C		1																		
Taiwan	C	16																			

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

CHOLERA—Continued

[C indicates cases; D, deaths; P, present]

Place		June 26–July 23, 1932	July 24–Aug. 20, 1932	Aug. 21–Sept. 17, 1932	Week ended— Sept. 24, 1932	October, 1932					November, 1932				December, 1932					January, 1933	
						1	8	15	22	29	5	12	19	26	3	10	17	24	31	7	14
Philippine Islands:																					
Bulacan Province	C		3																		
	D		2																		
Cebu Province	C					1															
Iloilo Province	C			1	13	3															
	D			1	8	2		1													
Iloilo	C		1																		
	D		1																		
Laguna Province	D	1																			
Leyte Province	C			43	4										6	1	6	[illegible]	1[illegible]	43	24
	D			18	2										6	1	2	[illegible]	[illegible]	[illegible]	11
Manila	C						1														
Samar Province	C			54	7	12		29	15	8	30	0	0	37				7	[illegible]	[illegible]	
	D			34	9	8		21	15	5	22	0	0	26				1	[illegible]	[illegible]	
Siam	C	1	1					1	1										1		
Straits Settlements: Singapore	C					1															
On vessels:																					
S. S. Shanghai Maru at Kobe from Shanghai	C		1																		
S. S. President Wilson en route to Manila from Honolulu via Shanghai and Hong Kong	C	2																			
	D	1																			
S. S. Protesilus at Hong Kong from Shanghai	C		P																		
S. S. Nikawa Maru at Hong Kong from Shanghai	C		P																		
S. S. Shantung at Swatow from Shanghai	C	1																			
S. S. Yusang at Hong Kong from Shanghai	C		1																		
S. S. Taisan Maru en route Tsingtao to Moji	C			1																	

Place		June, 1932	July, 1932	August, 1932			September, 1932			October, 1932			November, 1932			December, 1932	
				1–10	11–20	21–31	1–10	11–20	21–30	1–10	11–20	21–31	1–10	11–20	21–30	1–10	11–20
Indo-China (French) (see also table above):																	
Annam [1]	C		8														
	D		4														
Cambodia [1]	C	42	18	6	4			4	2	3	1		1			1	1
	D	24	16	3	2			2	2	3			1			1	
Cochin-China [1]	C	51	31	2	4	5	8	8	2	4	3	3				2	3
	D	42	27	1	4	3	7	7	2	4	1	2				2	3

[1] Reports incomplete.

PLAGUE[1]

Place		June 26–July 23, 1932	July 24–Aug. 20, 1932	Aug. 21–Sept. 17, 1932	Week ended—														
					Sept. 24, 1932	October, 1932					November, 1932				December, 1932				
						1	8	15	22	29	5	12	19	26	3	10	17	24	31
Angola: Naulila	C													P					
Argentina:																			
Chaco—Villa Angela	C			6															
Cordoba Province	C																2		
La Rioga Province	D											4							
Salta Province	C										7				12				
San Luis Province [2]	C		1													P			
Santa Fe	C																		1
Belgian Congo	C																1		
British East Africa (see also table below):																			
Tanganyika	D							10					1						
Uganda	C	83	62	100	20	24	19	32	39	32	45	70	52						
	D	79	56	68	19	21	21	30	33	32	44	75	52						
Ceylon: Colombo	C	6	1	5	3			2	2	4	1	2	2	1	3	5	1		
	D	6		5	3			1	2	4	1	1	2	2	2	1	1		
Plague-infected rats			2	1		1	1	1	1	3	1								
Chile: Antofagasta—Plague-infected rats			3		1														
Dutch East Indies:																			
Surabaya	C		1	1															
West Java	C	180	154	259	82	119	116	101	130	110	105	157	139	117	174				
	D	150	151	253	80	113	109	101	128	112	105	157	139	116	153				

[1] Including plague in the United States and its possessions.

[2] Several cases of plague with 1 death were reported at Quines, San Luis Province, Argentina, on Dec. 9, 1932.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

[C indicates cases; D, deaths; P, present]

Place		June 25–July 23, 1932	July 24–Aug. 20, 1932	Aug. 21–Sept. 17, 1932	Week ended— Sept. 24, 1932	October, 1932: 1	8	15	22	29	November, 1932: 5	12	19	26	December, 1932: 3	10	17	24	31
Ecuador. (See table below).																			
Egypt:																			
Alexandria	C	5	6	1			1	3											
Assiout	C		1															1	3
Beheira	C	1	1	2	1			1											
Beni Suef	C			1															
Gharbieh	C						1	1											
Minieh	C	1		2		3	1				1								
France: Marseille	C																		1
Great Britain: Liverpool—Plague-infected rats					[a] 1														
Hawaii Territory:																			
Hawaii Island—																			
Paauilo—Plague-infected rats													1				5	1	2
Maui Island—																			
Makawao	C		1	1															
Plague-infected rats			2	2		1													
India	C	1,122	2,545	3,775	1,312	1,482	1,789	1,465	1,464	903	1,779	1,276	1,336						
	D	631	1,452	2,208	760	863	1,031	827	780	550	965	778	813						
Bassein	C	2	4	1		1					1								
Plague-infected rats			1				1				1					1	1		
Bombay	C			4				1	3										
Plague-infected rats		21	32	27	11	9	6	4	9	10	11	1	3	5	2	5	1	7	
Madras	C		5																
Madras Presidency	C	233	247	315	115	93	66	69	73	61	65	67	94		114			[illegible]	
	D	98	122	110	50	45	25	33	17	26	21	28	32		47			2	
Rangoon	C	2	3	3							1	1	1	1	1				1
Plague-infected rats		5	5					2											
Indo-China. (See table below.)																			
Iraq: Baghdad	C	1	3	1	1					1	2			1					
Madagascar. (See table below.)																			
Morocco	C	7	1											10			2	8	
Peru. (See table below.)																			
Senegal. (See table below.)																			
Siam	C		1	8				1	4	1	2		1	5					1

South-west Africa.[4]																			
Syria: Beirut	C	4	2	4	1	2	1		1	4	2	2	5	6	1				
Union of South Africa: Orange Free State	C			1			P					P	P						
United States: California—San Benito County—Plague-infected ground squirrels			2																
On vessels:																			
S. S. City of Oxford at Liverpool from Alexandria—Plague-infected rats				1															
S. S. Figuig at Marseille from Bona and Philippeville	C			1															
S. S. Patris at Beirut	C											3							

Place		June, 1932	July, 1932	August, 1932	September, 1932	October, 1932	November, 1932	December, 1932
British East Africa (see also table above): Kenya	C	39	65	30	15	7	5	
Ecuador:								
Province—								
Chimborazo	C	2						
Loja	C		4		4			
Indo-China	C	1	2	2		1	1	3
	D	1	2	2		1		3
Madagascar:								
Province—								
Ambositra	C	2	20	9	30	35		
	D	2	20	8	25	34		
Antisirabe	C	10	31	45	42	73		
	D	9	30	45	41	73		
Maevatanana	C		1	1				
Miarinarivo	C	3	10	5	8	19		
	D	3	9	5	8	19		
Moramanga	C		15	4	52	225		
	D		15	4	49	208		
Tamatave	C	1	2	2		1	1	1
	D		1	2		1	1	1
Tananarive	C	13	24	35	75	178		
	D	12	24	35	75	173		

Place		June, 1932	July, 1932	August, 1932	September, 1932	October, 1932	November, 1932	December, 1932
Peru	C	2						
Department—								
Ancachs	C						[5] 2	
Lambayeque	C	2		1				
Libertad	C					1	[5] 1	
Lima	C		1		2	2		
Lima	C	2						
Piura	C						[5] P	
Senegal:								
Dakar [6]	C		10	37	7	3	1	16
	D		9	28	7	2	1	14
Louga [6]	C	1	4	1	2	9		
	D	1	3	1	2	6		
Rufisque [6]	C	21	28	23	8			
	D	17	27	21	5			
Thies [6]	C	8	16	5	15			
	D	3	13		11			
Tivaouane [5]	C				6			
	D				7			

[3] At dock where steamship City of Oxford was berthed.
[4] 204 cases of plague with 47 deaths were reported in Ovamboland, Southwest Africa, up to Oct. 29, 1932. Antiplague measures have been taken.
[5] Suspicious cases.
[6] Reports incomplete.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX

[C indicates cases; D, deaths; P, present]

Place		June 26–July 23, 1932	July 24–Aug. 20, 1932	Aug. 21–Sept. 17, 1932	Week ended— Sept. 24, 1932	October, 1932 1	8	15	22	29	November, 1932 5	12	19	26	December, 1932 3	10	17	24	31	Jan. 7, 1933
Algeria:																				
Algiers	C			1		1			1			1	1					1		
Southern Territories	C		2																	
Arabia: Aden	C								1				1	2			1			
Argentina:																				
Formosa Province	C			P																
Jujuy Province	C									1										
Belgium	C											1								
Brazil:																				
Parahyba—Joao Pessoa	C														P					
Pernambuco—Recife	C														P					
Porto Alegre (alastrim)	C	7	10	14	1	27	1	12	13	9	4									
Santos	C	2																		
British East Africa: Tanganyika	C	32	168	95	12	27	19	7	10	56	3	5								
British South Africa:																				
Northern Rhodesia	C	45	1								40									
Southern Rhodesia	C						1				26	1								
Canada:																				
Alberta	C													1						
Manitoba	C	1	1						1			1								
Ontario	C	1	3	3					1							3	10			
Toronto	C															3	3			
Saskatchewan	C	11		1	6										1	2		[illegible]		
Ceylon: Colombo	C														23	5	23			1
China:																				
Canton	C	3	4	1		2			6	4	5	13	14	15	[illegible]	72	[illegible]	[illegible]	[illegible]	221
	D								1		1		1	1	9	3	3	[illegible]	[illegible]	6
Foochow	C	P	P	P		P		P			P	P		P						
Hong Kong	C	3	2												1	1		[illegible]	[illegible]	10
Nanking	C	3						2							6					
Shanghai	C								1			4	1	7	4					
Swatow	C							1				4	2		1	5				
Chosen. (See table below.)																				
Colombia: Cali	D		2												1					
Dahomey	C	8		6	2				6											

Dutch East Indies	C	6	1	1			1		1	1										
Egypt:																				
Alexandria	C	4	9	12	2	2	1	12	7	5	5	6	8	15	12	42	79	131	154	219
	D	1	4	4	3			6	4	2	4	3	4	3	2	9	14	22	47	33
Cairo	C												1				1			
Finland	C		1																	
Great Britain:																				
England and Wales	C	104	76	51	7	23	17	12	38	34	21	23	16	14	27	15	28	16	19	
London	C	79	48	17	2	15	15	24		27	28	21	15	13	25	15	26	16	17	
London and Great Towns	C	95	67	38	4	21	17	11	33	34	21	22	16	14	26	15	27	16	18	
Greece. (See table below.)																				
Honduras:																				
Puerto Castilla	C	1				1							1							
Tegucigalpa	D			1																
Tela	C			1				2			2			1				1		
India	C	8,014	5,722	3,955	1,018	797	541	878	915	947	1,133	1,154	1,706	1,606						
	D	2,082	1,534	1,035	237	178	108	199	201	217	307	288	425	448						
Bassein	C		1																	
Bombay	C	26	42	32	7	6	9	5	7	6	8	12	10	14	20	43	58	44		
	D	20	17	21	6	3	6	5	3	4	5	3	3	4	10	18	3	20		
Calcutta	C	40	29	23	5	3	1	13	6	28	9	10	19	14	26	44	59	70		
	D	33	20	8	3	3		8	5	8	6	5	8	5	16	18	40	36		
Cochin	C	2									1									
Karachi	C	1	2	2		1								4	1	9	9	2		
Madras	C	35	47	51	14	20	25	30	24	33	45	35	24	26	36	33	55	33		
Moulmein	C		1	3																
Negapatam	C						1	1	1	1	1		2	2						
Rangoon	C	26	5		1				1		1	1	1		1		2			
Tuticorin	C			7	7	6	6		9			3	8		5					
Vizagapatam	C	1																		
India (French): Pondichery Territory	C	11	16	18	4	3	3	3					2		1					
Indo-China (see also table below): Saigon and Cholon	C	7	8	4	1		1					1					1			
Iraq:																				
Baghdad	C	9	4	6	1	3		2	3	2	2	3	14	12	4	1	6	4	1	2
Basra	C	4		6	2	10	5	16	18	17	21	29	27	22	19	13	11	4	6	4
Mexico:																				
Chihuahua	D	1	3																	
Mexico, D. F.	C	16	12	9			4		1		2	1	1	1						
Monterrey	C											1								
Saltillo	D	3	3	2					1			2	2	4	1	4	4	1	1	2
San Luis Potosi	D									1		2								
Torreon	C					4	1			1										
Morocco. (See table below.)																				
Nigeria	C	123	402	83				58	1	57										
Palestine	C	1																		
Persia	C			99	35	43	53	58	104	86	104	110	89	90	67	95	64			
	D			46	27	16	17	34	39	55	35	37	36	41	52	41	27			
Peru. (See table below.)																				
Poland	C		1														1			

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths; P, present]

Place		June 26–July 23, 1932	July 24–Aug. 20, 1932	Aug. 21–Sept. 17, 1932	Week ended— Sept. 24, 1932	October, 1932: 1	8	15	22	29	November, 1932: 5	12	19	26	December, 1932: 3	10	17	24	31	Jan. 7, 1933
Portugal:																				
Lisbon	C	10	16	9	2	2	2	3		4		1	1	3	1	4	7	3		
Oporto	C	29	23	18	1		4				1		4	2	4	4		5	4	
Sarawak	C	7																		
Sierra Leone [2]	C		6	16																
Straits Settlements	C			2																
Sudan (Anglo-Egyptian)	C			1					8					5						
Syria. (See table below.)																				
Turkey. (See table below.)																				
Union of Socialist Soviet Republics. (See table below.)																				
Union of South Africa:																				
Cape Province	C	P						P	P	P		P	P	P	P					
Orange Free State	C			P		P	P			P	P				P					
Transvaal	C													P						
Upper Volta	C		1																	
On vessels:																				
S. S. Marinix Van Ste. Aldegonde at Port Said	C	2																		
S. S. British Engineer at Marseille	C															1				
S. S. Ranjput at Cochin from Colombo	C	1																		
S. S. British Splendour en route to Gibraltar	C												1							
S. S. Jervis Bay en route to Southampton	C												1							
	D												1							
S. S. Star of Alexandria at Alexandria	C																	1		
S. S. Kohistan at Aden from Basra	C												1							

[2] From Mar. 6 to July 9, 1932, 378 cases of smallpox, with 13 deaths, were reported in Sierra Leone.

Place		July, 1932	August, 1932 1-10	August, 1932 11-20	August, 1932 21-31	September, 1932 1-10	September, 1932 11-20	September, 1932 21-30	October, 1932 1-10	October, 1932 11-20	October, 1932 21-31	November, 1932 1-10	November, 1932 11-20	November, 1932 21-30	December, 1932 1-10	December, 1932 11-20	December, 1932 21-31
Indo-China (see also table above)	C	188	36	42	69	73	39	15	52	76	29	50			38	68	
	D	58	16	17	28	36	20	6	15	21	10	19			15	11	
Syria: Beirut	C	1			1							4	17	20	4	13	17

Place		May, 1932	June, 1932	July, 1932	August, 1932	September, 1932	October, 1932	November, 1932
Chosen	C	55	50	9	5			
	D	8	4	7	3			
Greece	C			2				
Morocco	C	101	27	11	19	24	33	53
Peru	C				35	166	75	67

Place		May, 1932	June, 1932	July 1932	August, 1932	September, 1932	October, 1932	November, 1932
Turkey (see also table above)	C			3	30	13	17	
	D				3	1	1	
Union of Socialist Soviet Republics	C	3,259	1,672	967	535			

Place		May 29-June 25, 1932	June 26-July 23, 1932	July 24-Aug. 20, 1932	Aug. 21-Sept. 17, 1932	Week ended— Sept. 24, 1932	October, 1932 1	October, 1932 8	October, 1932 15	October, 1932 22	October, 1932 29	November, 1932 5	November, 1932 12	November, 1932 19	November, 1932 26	December, 1932 3	December, 1932 10	December, 1932 17	December, 1932 24
Algeria:																			
Algiers	C	30	33	10	34	2	5	3	3		1	5	1		2				
Bone	C							2										1	
Constantine Department	C	1	102	20											2		1		
Oran	C	10																	
Argentina: Buenos Aires	C				1														
British East Africa: Uganda	C								16	18		1							
Bulgaria	C	15	10	4	1											2	[illegible]		
Chile (see also table below):																			
Antofagasta	C	1									1								
Iquique	C	1	1																
Santiago	C	8	15		22		22	10	19	11	7	6	17	4					
Talcahuano	D			1															
China: Hankow	C	1	1																

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER—Continued

[C indicates cases; D, deaths; P, present]

Place		May 29–June 25, 1932	June 26–July 23, 1932	July 24–Aug. 20, 1932	Aug. 21–Sept. 17, 1932	Week ended— Sept. 24, 1932	October, 1932 1	8	15	22	29	November, 1932 5	12	19	26	December, 1932 3	10	17	24
Chosen. (See table below.)																			
Colombia: Cali	D						1							1					
Czechoslovakia. (See table below.)																			
Egypt:																			
Alexandria	C	8		1	5											2			
Beheira	C			15		21													
Gharbieh	C				1			1											
Port Said	C	1	3	3	1				1			1		1					
Provinces	C	139	122	49	6	3													
Greece. (See table below.)																			
Guatemala. (See table below.)																			
Irish Free State:																			
Cork County—																			
Bandon	C								1										
Schull	C			1															
Dublin	C						1	1											
Kerry County—																			
Dingle	C				1														
Killarney district	C												1		26			2	3
Roscommon	C	1																	
Lithuania. (See table below.)																			
Mexico:																			
Mexico, D. F.	C	7	11	4	10			1	2	2	1	6	2	6	1				
Monterrey	C			1															
Torreon	C		1		6									1	1				
Morocco	C	26	6	8	7	1		1						2	4	7	9	17	1
Palestine	C	4	1		6	1	1	3			1	1			1	1			
Persia	C	110	54	7	6	3			13				2	1	6		4	6	
Peru. (See table below.)																			
Poland	C	204	101	29	26	18	33	50	19	21	15	7	29	13	14	17	21	32	
	D	14	8	2	2	1	1	4	3	7	3	1	2	2	1	2	1	4	
Portugal:																			
Lisbon	C	7																	
Oporto	C	4				1													

Rumania	C	45	56	20	17	2	5	1	1	1	6			22	17	46			9
Tunisia: Tunis	C	28	8	6															
Turkey. (See table below.)																			
Union of Socialist Soviet Republics. (See table below.)																			
Union of South Africa:																			
Cape Province	C	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
Natal	C	P	1			P				P	P	P		P	P				
Orange Free State	C	P	P	P	P	P	P	P	P	P	P	P	P		P				
Transvaal	C	P	P												P				
Yugoslavia. (See table below.)																			

Place		June, 1932	July, 1932	August, 1932	September, 1932	October, 1932	November, 1932	December, 1932
Chile: Coquimbo Province	C						60	
Chosen: Seoul	C	2						
Czechoslovakia	C	1						
Greece	C	4	3	14	15	4		
Guatemala	C	19		2	9			

Place		June, 1932	July, 1932	August, 1932	September, 1932	October, 1932	November, 1932	December, 1932
Lithuania	C	16	7		5			1
Peru	C			37	50	81	75	
Turkey	C	4	7	8	6	11		
Union of Socialist Soviet Republics	C	7,419	6,054	2,058				
Yugoslavia	C			1			3	11

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

YELLOW FEVER

[C indicates cases; D, deaths; P, present]

Place		June 26–July 23, 1932	July 24–Aug. 20, 1932	Aug. 21–Sept. 17, 1932	Week ended— Sept. 24, 1932	October, 1932: 1	8	15	22	29	November, 1932: 5	12	19	26	December, 1932: 3	10	17	24	31	Jan. 7, 1933
Brazil:																				
Ceara State	C			1	1						1									
	D		3	1	1															
Parahyba State	D			2		1														
Pernambuco State	D	6	1	3				1												
French West Africa: Guinea	C											2	1	2		1				
	D											2	1	2		1				
Guinea (Portuguese): Bissagos Island	C																			43
	D																			13
Senegal	C								8											
	D								5											
Bakel—Kidira	C					1	4	1												
	D					1	4													
Upper Gambia	C				2			1												
	D				2															
Sudan (French): Keyes	C										3	1		1	1					
	D										3	1		1	1					
Upper Volta	C	1																		
	D	1																		

X

UNITED STATES ~~TREASURY~~ DEPARTMENT

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BY THE UNITED STATES PUBLIC HEALTH SERVICE

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HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst. Surg. Gen. R. C. WILLIAMS, *Chief of Division*

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PUBLIC HEALTH REPORTS

VOL. 48 — FEBRUARY 3, 1933 — NO. 5

LOSS OF LIGHT DUE TO SMOKE IN BALTIMORE, MD., FROM OCTOBER, 1929, TO SEPTEMBER, 1930

By JAMES E. IVES, *Senior Physicist, Office of Industrial Hygiene and Sanitation, United States Public Health Service*

OBJECT AND METHOD OF THE STUDY

At the request of the committee on air pollution of the Baltimore Association of Commerce, and with the cooperation of the commissioner of health of Baltimore, Dr. C. Hampson Jones, the United States Public Health Service undertook to make a study of the loss of light due to smoke in the city of Baltimore during the years 1929 and 1930. The method pursued was that described in Public Health Bulletin No. 197, a report of a similar study made in the city of New York during the year 1927. The method was to record the daylight, by means of a photoelectric cell and a recording potentiometer, on the roof of a building in the smoky part of the city and, by a similar cell and recording potentiometer, at a point outside the city where the air was comparatively free from smoke. The difference between the records obtained with the two recorders, after making certain corrections, was taken as the loss of light due to the smoke in the atmosphere. Records were taken in Baltimore from March, 1929, to November, 1930; but in this report the records for only 12 months are used, viz, those from October 1, 1929, to September 30, 1930.

One photoelectric cell was placed on the roof of the Central Police Building, at the corner of Fayette Street and Fallsway, in Baltimore. This building is centrally located, and it may be assumed that the atmosphere in this region has at least the average condition of smokiness in the city. The other cell was placed on the roof of one of the buildings of the State sanitarium at Mount Wilson, about 10.5 miles northwest of the police building. Mount Wilson is about 573 feet above sea level, and the air there is unusually clear and free from smoke. The buildings of the sanitarium are on the summit of a hill, surrounded by fields and woods, with very few other buildings in their neighborhood. The roof of the building on which the cell

was placed is about 30 feet above the ground The latitude and longitude of the Central Police Building are 39° 17.5′ N., 76° 36.4′ W, and of Mount Wilson, 39° 22 9′ N, 76° 46′ W.

RESULTS OF THE STUDY

Figures 1 to 9 present graphically the results of the study for the 12 months from October, 1929, to September, 1930, inclusive

In Table 1 are shown the number of days used in each month Records were used only where they were complete at both stations, and where the conditions of cloudiness were the same at both stations. Records taken in rainy weather were not used These restrictions greatly reduced the number of days that could be used for comparison Sundays and holidays were included in the study, in order to use as many days as possible

TABLE 1 —*Number of clear, cloudy, and mixed days used in the calculation of the average horizontal illumination at the police building in Baltimore and at the State sanitarium at Mount Wilson*

Type of day	1929			1930									Total
	October	November	December	January	February	March	April	May	June	July	August	September	
Clear	6	7	5	6	5	7	4	6	3	2	2	1	54
Cloudy	6	11	7	9	5	2	4	2	1	0	1	1	49
Mixed	8	6	7	2	9	11	12	10	1	7	5	12	90
Total	20	24	19	17	19	20	20	18	5	9	8	14	193

For the purposes of analysis, the days used in the study were divided into three groups—clear, cloudy, and mixed When all the days were used, the averages are given as for "all days" By clear days are meant days on which all the hours were clear; by cloudy days, days on which all the hours were cloudy; by mixed, days on which some hours were clear and some cloudy. An hour was called clear if more than half of it was clear, and cloudy if more than half was cloudy

In Figures 1 to 3 are plotted the average values of the horizontal illumination, in terms of divisions on the recorder, at Mount Wilson and at Baltimore, for each month in the year for every hour of the day, and the average values for each hour for the whole year. The daily average for every month of the year is also shown. The hours of the day are given in local apparent time As stated in the report of the New York study,[1] the readings on the recorders were not exactly proportional to the illumination, but probably did not depart from proportionality by more than plus or minus 10 per cent. The recorder readings can be

[1] Public Health Bulletin No 197, p. 7.

converted into approximate foot-candles by multiplying them by 177, the average number of foot-candles represented by one division on the recorder paper In Figure 1 are plotted, for clear, cloudy, and all days, the monthly averages of the illumination at the Mount Wilson Sanitarium in terms of recorder readings, for the first six

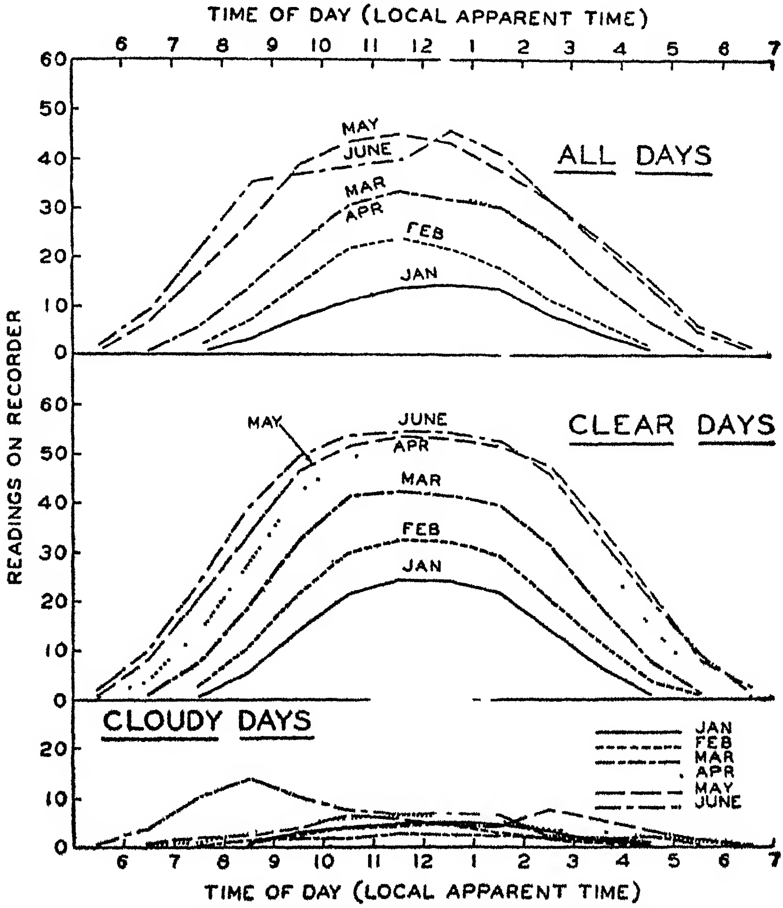

FIGURE 1 – Average hourly horizontal illumination by month at Mt Wilson Sanitarium, January to June, 1930

months of the year for every hour of the day, and in Figure 2 are plotted the same quantities for the last six months In Figure 3 are plotted the average hourly illuminations for the whole year for the three classes of days, both for Mount Wilson and for Baltimore.

In Figure 4 are plotted, as clear and cross-lined bars, respectively, the average total daily horizontal illumination at Mount Wilson and at the Central Police Building for every month of the year, the illumination being represented in terms of an index number of 100 for June at Mount Wilson. It will be seen that the average total daily hori-

zontal illumination was greatest in July at both places, and least in December.

In this figure are also plotted, as solid black bars, the differences between the average daily horizontal illuminations at Mount Wilson and the Central Police Building. These differences represent the total loss of light at the Central Police Building, due to smoke, for

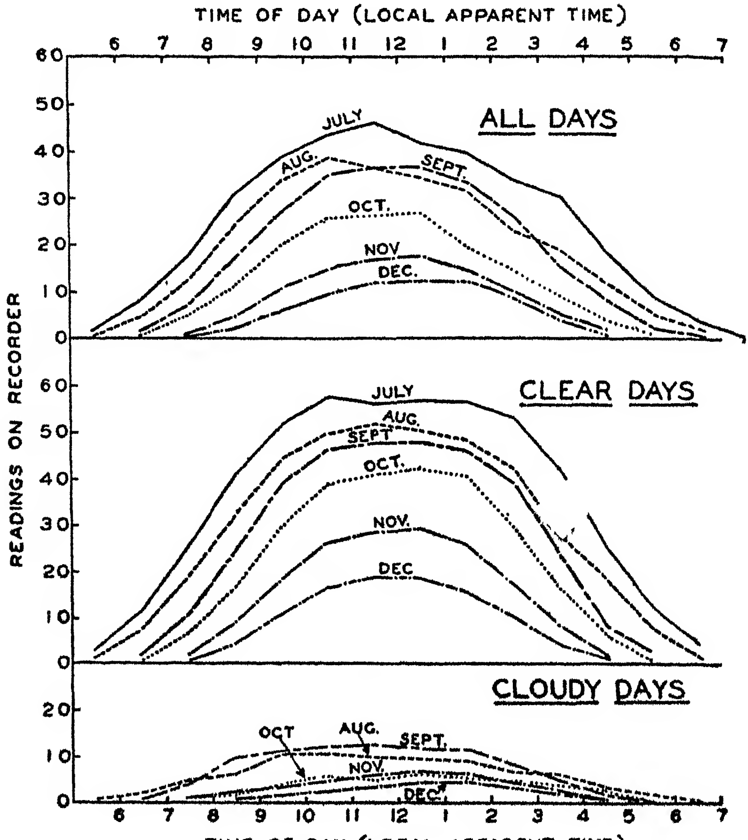

FIGURE 2.—Average hourly horizontal illumination by months at Mt. Wilson Sanitarium, July to September, 1930, and October to December, 1929

each month of the year. It will be noticed that the total loss of light is greatest in July and least in December. In the New York study referred to above, the greatest total loss of light was also found in July and the least in December.

The average values for the percentage loss [3] of light at the Central Police Building for each hour for clear, cloudy, and all days was

[3] By percentage loss is meant the fraction, expressed as a percentage, of the light falling on Baltimore which is absorbed by smoke in the atmosphere at the Central Police Building. The percentage loss should not be confused with the absolute, or total loss, the absolute loss being the total amount of light lost at the Central Police Building due to smoke.

computed. For all classes of days the percentage loss is 14.1 per cent; for clear days, 13.2 per cent; and for cloudy days, 15.9 per cent. For clear days the average hourly percentage loss for the whole year varies with the time of day, being greater in the morning and in the late afternoon than at 2.30 p. m. For cloudy days, on the other hand, the average hourly percentage loss for the whole year is less in the morning and in the late afternoon than at 1.30 p. m. For all days of the year the average hourly percentage loss for the whole year showed a tendency to decrease during the course of the day.

An analysis of the percentage loss of light for clear days when the records for Sundays and holidays were omitted did not show any

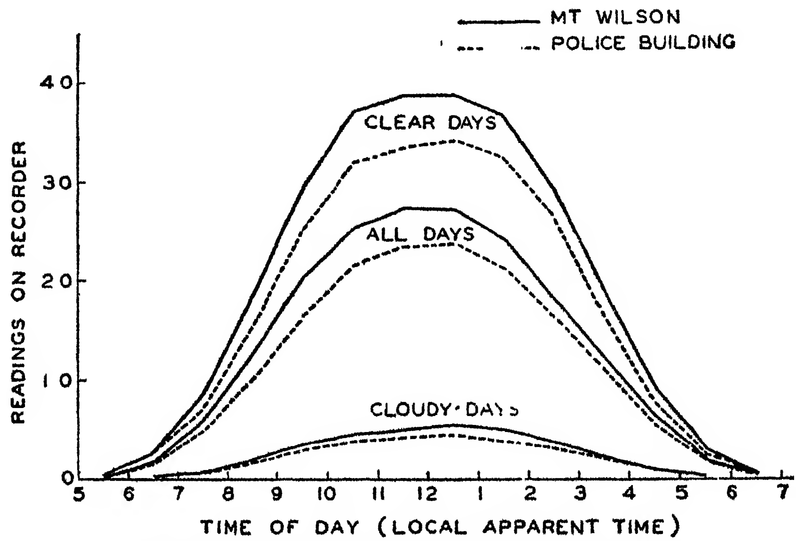

FIGURE 3. - Average hourly horizontal illumination at Mt. Wilson Sanitarium and at the Central Police Building for the year October 1, 1929, to September 30, 1930

great differences from those obtained when they were included. For the hours from 8 a. m. to 5 p. m. the average hourly percentage losses on clear days, when Sundays and holidays were omitted, for the whole year were 15.9, 16.4, 15.0, 14.4, 15.0, 12.4, 12.6, 12.2, 15.4, and 16.5, respectively. As would be expected, the percentage losses are in general slightly greater when Sundays and holidays are omitted.[3]

Figure 5 shows how the average percentage loss of light varies with the time of day, for clear, cloudy, and all days. Figure 6 shows how it varies with the time of year for clear, cloudy, and all days. In Figure 6 are also plotted the average relative humidities for each

[3] The percentage losses for clear days for Sundays and holidays only, for 12 days distributed throughout the year, for the hours from 8 a. m. to 5 p. m. were found to be 13.6, 15.3, 14.4, 11.4, 11, 11.7, 7, 5.7, 8.1, and 8.7, respectively. It will be observed that these values are considerably lower than those for working days, especially in the afternoon.

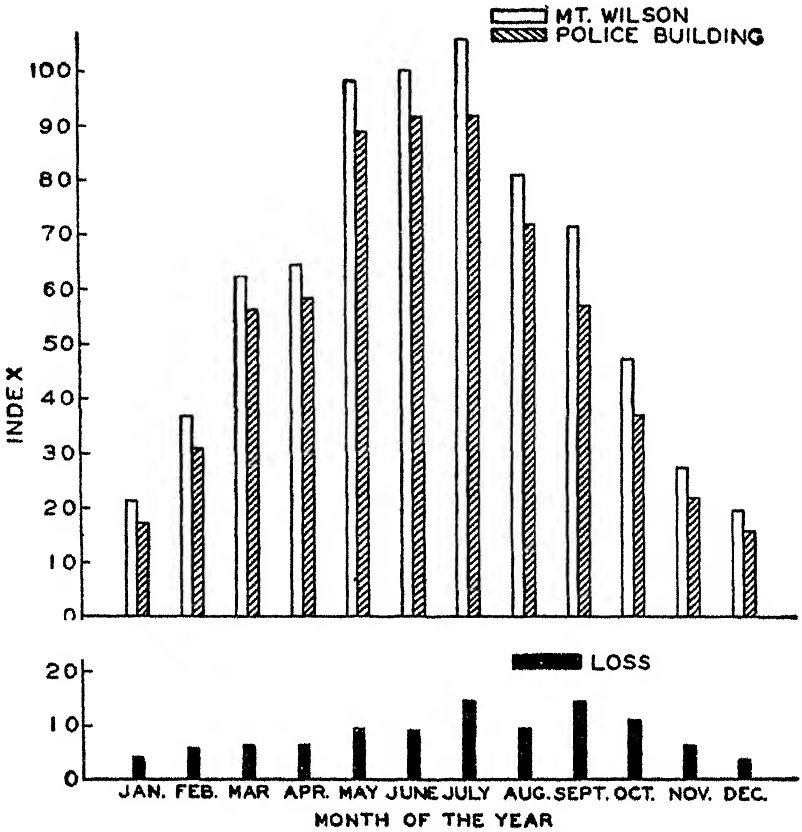

FIGURE 4.—Average total daily horizontal illumination, referred to an index number of 100 for June, at Mt. Wilson for every month of the year October 1, 1929, to September 30, 1930, and at the Central Police Building, and the difference between the two, which represents the total loss of light at the Central Police Building due to smoke

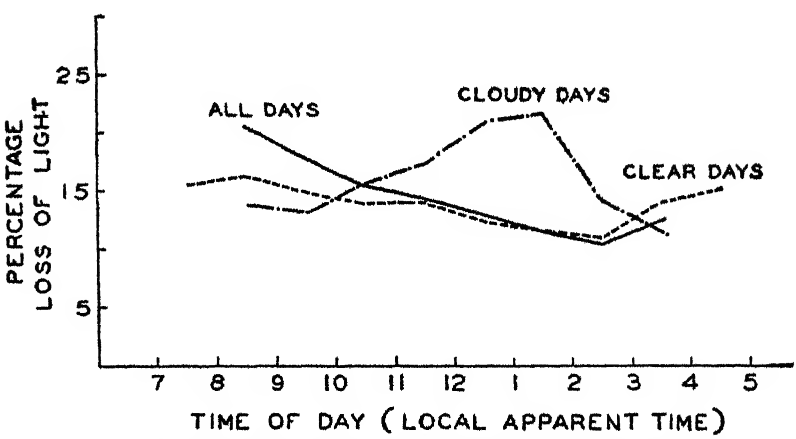

FIGURE 5.- Average hourly percentage loss of light at the Central Police Building, for the year October 1, 1929, to September 30, 1930, for clear, cloudy, and all days

month of the year. The average relative humidities were determined from the values given in the Monthly Meteorological Summary of the United States Weather Bureau in Baltimore for 8 a. m., noon, and 8 p. m. Only the values for the days for which the percentage loss of light was determined were used. It will be noted that for clear days and all days the percentage loss was in general low when the relative humidity was low. This relation is not clearly marked for cloudy days. The negative value of the average percentage loss for March for cloudy days is probably due to the very small values of the illumination at Mount Wilson and at the police building on the two cloudy days that could be used in this month. The occurrence of negative percentage losses and possible explanations are discussed in the section that follows.

The percentage losses of light at the Central Police Building in Baltimore from October 1, 1929, to September 30, 1930, both hourly and monthly, were considerably less than those found in the New York study at the lower end of Manhattan Island during the year 1927,[4] the former being, on an average, only about two-thirds of the latter.

Relation of the percentage loss of light to the character of the sky, clear or cloudy, to the relative humidity, and to the direction and velocity of the wind.—As in the New York study,[5] an attempt was made to determine the relation of the average daily loss of light to the average daily relative humidity and to the average velocity and direction of the wind. The average daily values of these quantities are plotted in Figures 7, 8, and 9. The values for the average velocity and direction of the wind were obtained from the hourly values of these quantities recorded by the United States Weather Bureau at its station in Baltimore.

In Figure 7 are plotted the average daily values of the percentage loss of light as a function of the relative humidity. Dots represent the values for clear days and crosses give the values for cloudy days. Points representing the mean values of the percentage loss for the humidity intervals 20.1 to 40, 40.1 to 60, etc., are connected by a solid straight line for the clear-day values and by a broken line for the cloudy-day values.

The negative percentage losses shown by points lying below the axis of abscissae, represent values for which the average illumination for the day was, for some unknown reason, greater at the Central Police Building than at Mount Wilson. It is hard to say why this occurred in a number of cases. It might be due to the fact that the condition of clouds or haze was not exactly the same in the two places. Another possible explanation is that a slight amount of

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[4] Public Health Bulletin No. 197, p. 14.

[5] Public Health Bulletin No. 197, pp. 20-23.

smoke in the atmosphere may actually increase the illumination on a horizontal plane rather than decrease it. It is well known that the illumination on a horizontal plane due to the sky alone is greater when the atmosphere is slightly hazy than when it is perfectly clear. The same effect may possibly occur when there is a small amount of smoke in the air.

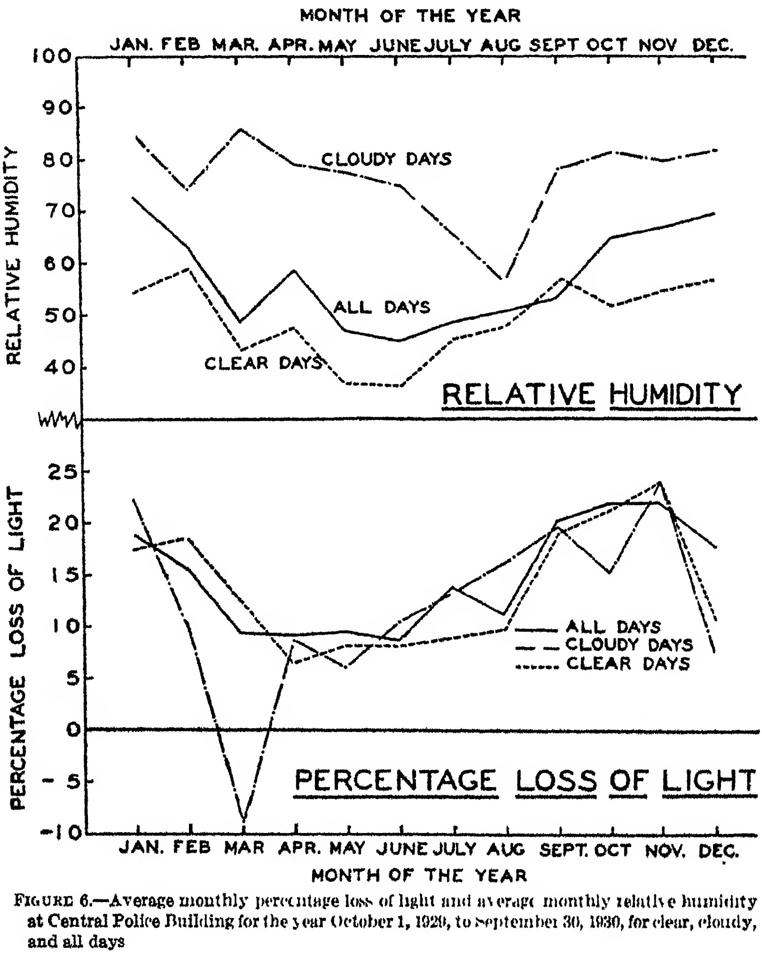

FIGURE 6.—Average monthly percentage loss of light and average monthly relative humidity at Central Police Building for the year October 1, 1929, to September 30, 1930, for clear, cloudy, and all days

It will be noted from Figure 7 that there is a considerable increase of the percentage loss with increase of relative humidity both for clear and cloudy days. It will also be noted that for the same degree of relative humidity the percentage loss of light was less for cloudy days than for clear days. This latter result is the reverse of that found in the New York study.

Since both the percentage loss and the relative humidity vary greatly during the course of the same day, and since the average rela-

tive humidity for the day is not known accurately (only the values for 8 a. m., noon, and 8 p. m. being known), it was thought advisable to calculate the average percentage loss of light for the hour on either side of noon, that is, for the two hours from 11 a. m. to 1 p. m. These values are plotted in Figure 8. The curves plotted by taking the averages of the percentage losses for the humidity intervals from 20.1 to 40, 40.1 to 60, etc., show that for the noon hours the percentage loss increases with the relative humidity, both for clear and cloudy hours. Also, that the percentage losses of light for cloudy hours are less than those for clear hours. This latter result is again the reverse of that found in the New York study.[6] It is explained by the large number of negative percentage losses for cloudy days which occur in the Baltimore study and which, as previously suggested, may possibly be due to the fact that a small amount of smoke in the air may actually increase the horizontal illumination.

The effect of the velocity of the wind on the percentage loss of light by smoke is shown in Figure 9. Here the values of the percentage loss for clear days have been separated according to the average daily velocity of the wind into two groups—those in which the average daily velocity of the wind was less than 10 miles an hour and those in which it was 10 or more miles an hour. The points representing the mean values for the percentage losses, for each group, for the humidity intervals 0 to 40, 40.1 to 60, and 60.1 to 80, are connected by solid straight lines. It will be seen from the curves that for clear days the percentage losses are greater for the low-velocity winds than for the high, and also that there is again an increase of the percentage loss of light with an increase of relative humidity. For cloudy days no definite relation could be found between the percentage loss of light and the average velocity of the wind.

The effect of the direction of the wind upon the percentage loss of light was investigated by calculating the average percentage loss when the prevailing wind came from the north, northwest, west, southwest, south, southeast, east, or the northeast, both for clear and cloudy days. The results show that for clear days the greatest percentage loss was for south winds, viz, 16.2 per cent, and the least for northwest winds, 8.3 per cent. For cloudy days, the greatest percentage loss was for southwest winds, viz, 23 per cent, and the least for northwest winds, 8 per cent. The loss for south winds on cloudy days was nearly as great as that for southwest winds, being 21.7 per cent.

SUMMARY

1. Records of the total horizontal illumination were obtained from October 1, 1929, to September 30, 1930, at the Central Police Building, Baltimore, Md., where the air was smoky, and at the State sanitarium

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[6] Public Health Bulletin No. 197, pp. 22 and 27.

at Mount Wilson, about 10.5 miles to the northwest of Baltimore, where the air was comparatively free from smoke

2 From these records the average hourly illumination on a horizontal plane for each month of the year, the average hourly illumination for the whole year, and the daily average for each month have been calculated for each place

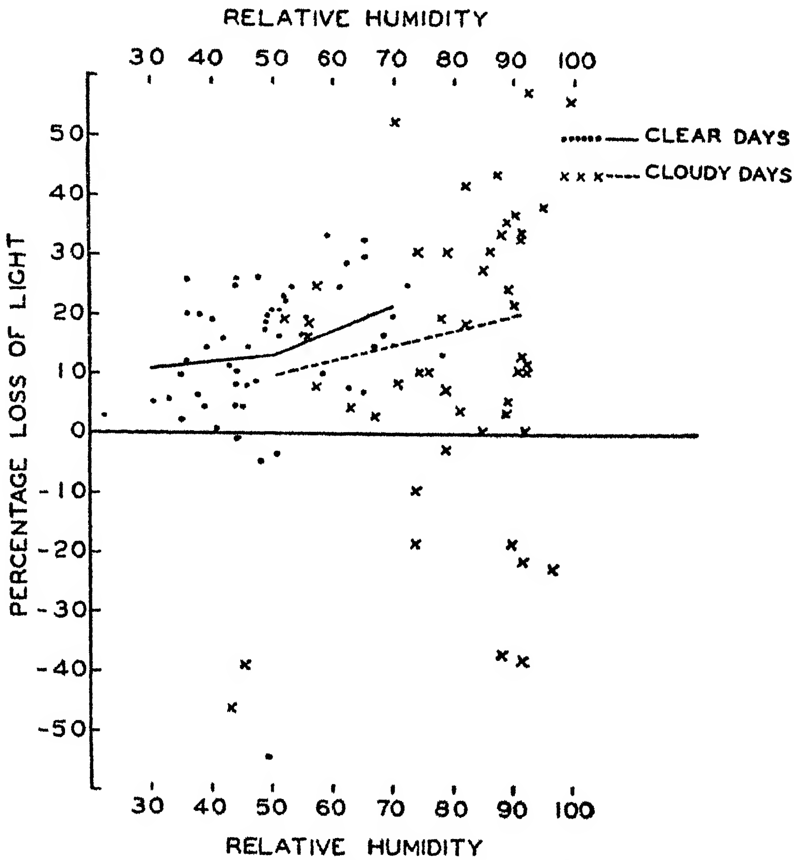

Figure 7 Relation of the daily percentage loss of light to the relative humidity for clear and cloudy days

3. The absolute and relative losses of light from smoke at the Central Police Building have been determined from the records.

4 The highest average daily horizontal illumination at Mount Wilson occurred in July and the lowest in December. The greatest total loss of light at the Central Police Building was also in July and the least in December.

5. The records showed a large relative loss of light due to smoke. In some cases the average hourly or daily loss was greater than 50 per cent. The average loss for the whole year was 13.2 per cent for clear days, 15.9 for cloudy days, and 14.1 for all days. The average

percentage loss of light for the whole year was therefore greater on cloudy days than on clear days.

6. The percentage loss of light for clear days at the Central Police Building in Baltimore varied with the time of the day, being greater in the morning and in the late afternoon than at 2.30 p. m.; the aver-

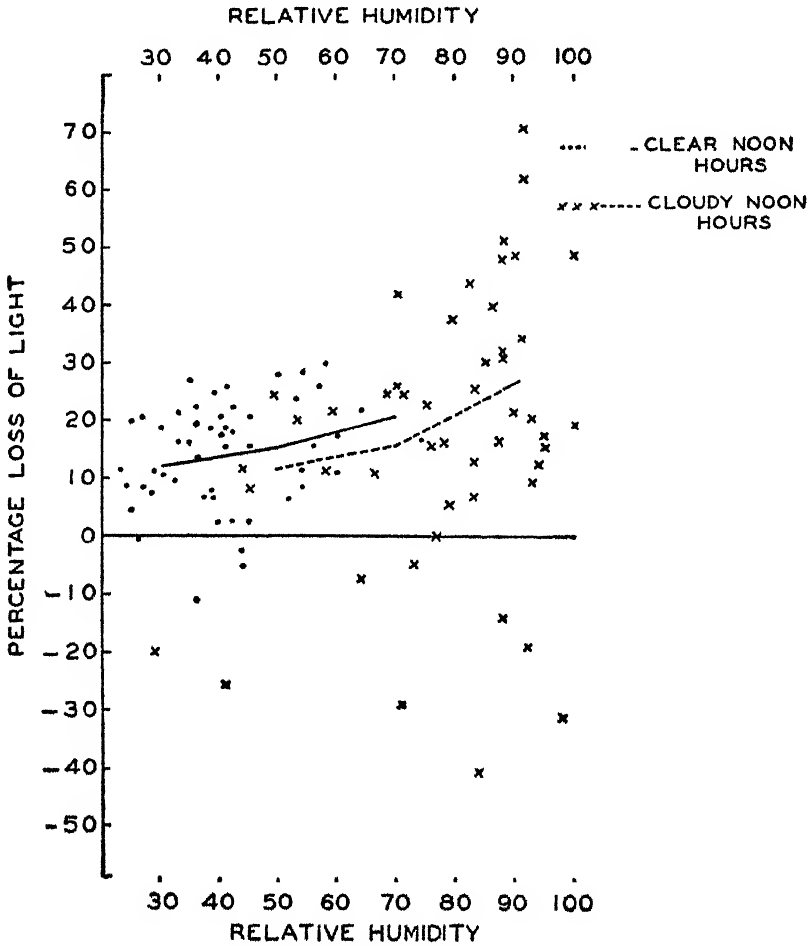

FIGURE 8.—Relation of the percentage loss of light to relative humidity during the noon hours (11 a. m. to 1 p. m.) for clear and cloudy days.

age loss of light for the whole year for the hours ending at 8 a. m., 3 p. m., and 5 p. m., was 15.5, 10.8, and 14.8 per cent, respectively. For cloudy days, the percentage loss of light was found to be less in the morning and in the late afternoon than at 1.30 p. m.; for the hours ending at 9 a. m., 2 p. m., and 4 p. m. it was 13.6, 21.5, and 11.5 per cent, respectively.

7. The analysis of the results showed that the percentage loss of light depended, among other things, upon the nature of the sky,

whether clear or cloudy, upon the relative humidity of the air, and upon the velocity and direction of the wind.

8. For the same relative humidity the average percentage loss of light, both for the whole day and for the noon hours only, was found to be less for a cloudy than for a clear sky. In the New York study, the reverse was found to be true

9. For the same kind of sky, clear or cloudy, and for the whole day, or for the noon hours only, the average percentage loss of light increased with increase of relative humidity, the percentage loss of light being about twice as great for 70 per cent relative humidity as for 30 per cent for clear days and clear noon hours, and about twice as

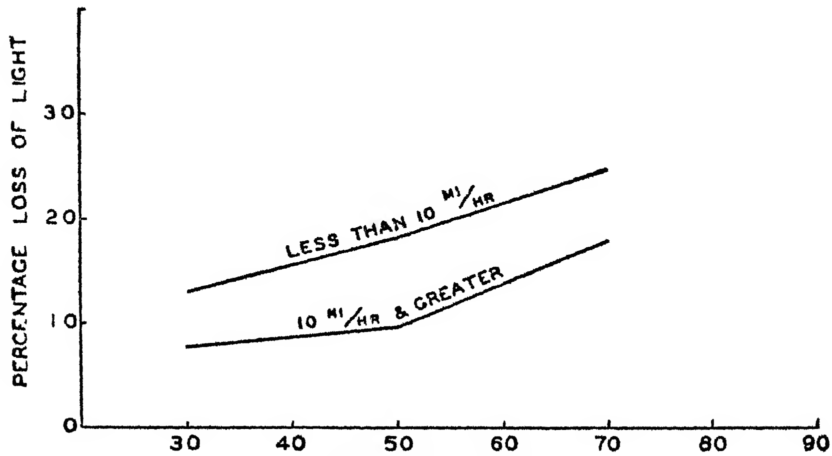

Figure 9.—Relation of the percentage loss of light to the relative humidity and to the velocity of the wind for clear days.

great for 90 per cent relative humidity as for 50 per cent for cloudy days and cloudy noon hours.

10. Other conditions being the same, the percentage loss of light for clear days was found to decrease as the velocity of the wind increased, being roughly inversely proportional to the velocity of the wind. No definite relation between the percentage loss of light and the average velocity of the wind was found for cloudy days.

11. For clear days the percentage loss of light was found to be greatest for southerly winds, and least for northwesterly. For cloudy days the percentage loss was greatest for southwesterly and southerly winds, and least for northwesterly.

ACKNOWLEDGMENTS

Acknowledgment is made of the assistance rendered during the investigation by the health department of the city of Baltimore, Dr. C. Hampson Jones, commissioner; by the committee on air pollution

of the Baltimore Association of Commerce, Mr. Willoughby M. McCormick, chairman; and by the State sanitarium at Mount Wilson, Dr. J. A. Smith, superintendent. Acknowledgment is also made of the assistance rendered by Assistant Scientific Aide J. Harold Link, in the analysis of the results.

COURT DECISION RELATING TO PUBLIC HEALTH

Effect on municipal health ordinances of adoption by city of commission government.—(New Jersey Supreme Court; Quacci *v.* City of Union City et al., 162 A. 719; decided Oct. 17, 1932.) An act of the New Jersey Legislature, passed in 1911 and amended in 1912, relating to commission government, vested cities adopting the act with authority to enact and enforce all ordinances necessary for the protection of life, health, and property, and provided that all ordinances or resolutions already passed, not inconsistent with the rights and powers granted, should remain in force until altered or repealed by the commissioners. A 1913 supplemental law abolished in commission-government cities all boards and bodies, whether State or local municipal agencies (except the board of education and the district court or courts), and imposed their powers and duties upon the board of commissioners. In 1928 the Board of Health of Union City adopted an ordinance regulating the slaughter of poultry. Some years later the city adopted a commission government. In a case involving a conviction for violation of the poultry ordinance, the supreme court held that the ordinance was continued by the terms of the commission government act, saying:

We think that the ordinances of the board of health were continued by the express provisions of the Pamphlet Laws of 1912 quoted, and that the power to enforce them was, by the enactment of 1913, vested in the board of commissioners chosen after commission government was adopted.

The ordinance of the old board of health was an ordinance passed in Union City, and as such it was continued by the Walsh Act. The enforcement of the ordinance was vested in the board of commissioners when the board of health was abolished by the adoption of commission government. To construe the legislative language otherwise would leave a city adopting commission government without health ordinances until new ones were adopted. Such view seems contrary to the expressed legislative intention, which appears to have been to hold old ordinances until new ones were adopted and to vest the enforcement thereof in the city commission.

PROVISIONAL SUMMARY OF MORTALITY STATISTICS, 1931

The Bureau of the Census announces that, in the United States death registration area, in the calendar year 1931, there were 1,322,587 deaths, or a death rate of 1,107.5 per 100,000 population, as compared with 1,343,356 deaths, or a rate of 1,133.1 in 1930.

The five leading causes of death were the same in 1931 as in 1930; namely, diseases of the heart, cancer, nephritis, cerebral hemorrhage, and the pneumonias; and in each of the years these five causes were responsible for slightly over 50 per cent of the total number of deaths which were reported in the registration area. The principal causes of death, the total number of deaths, and the death rates for the years 1930 and 1931 are shown in the accompanying table:

Cause of death	Deaths and death rates in the United States registration area, 1931 and 1930			
	Number		Rate per 100,000 estimated population	
	1931	1930	1931	1930
Total deaths (all causes)[1]	1,322,387	1,343,356	1,107.5	1,133.1
Typhoid and paratyphoid fever	5,382	5,698	4.5	4.8
Smallpox	95	165	.1	.1
Measles	3,576	3,820	3.0	3.2
Scarlet fever	2,650	2,279	2.2	1.9
Whooping cough	4,619	5,707	3.9	4.8
Diphtheria	5,738	5,822	4.8	4.9
Influenza	31,701	23,066	26.5	19.5
Dysentery	2,441	3,356	2.0	2.8
Erysipelas	2,275	2,508	1.9	2.1
Acute poliomyelitis and acute polioencephalitis	2,096	1,370	1.8	1.2
Lethargic or epidemic encephalitis	972	1,062	.8	.9
Epidemic cerebrospinal meningitis	2,832	4,211	2.4	3.6
Tuberculosis (all forms)	81,395	84,741	68.2	71.5
Of the respiratory system	72,515	75,120	60.7	63.4
Of the meninges, central nervous system	2,709	2,995	2.3	2.5
Other forms	6,171	6,626	5.2	5.6
Syphilis[2]	16,454	16,676	13.8	14.1
Malaria	2,536	3,403	2.1	2.9
Cancer and other malignant tumors	118,141	115,265	98.9	97.2
Of the buccal cavity	3,563	3,543	3.0	3.0
Of the pharynx	1,004	1,011	.8	.9
Of the esophagus	2,038	1,896	1.7	1.6
Of the stomach and duodenum	25,397	25,408	21.3	21.4
Of the liver and biliary passages	10,290	10,388	8.6	8.8
Of the pancreas	3,139	2,969	2.6	2.5
Of other digestive tract and peritoneum	17,919	17,151	15.0	14.5
Of the respiratory system	4,039	3,818	3.4	3.2
Of the uterus	14,464	14,132	12.1	11.9
Of other female genital organs	2,505	2,290	2.1	1.9
Of the breast	11,411	10,912	9.6	9.2
Of the male genito-urinary organs	9,184	8,661	7.7	7.3
Of the skin	2,986	3,019	2.5	2.5
Of other or unspecified organs	10,199	10,037	8.5	8.5
Rheumatism and gout	4,133	4,493	3.5	3.8
Diabetes mellitus	24,331	22,528	20.4	19.0
Pellagra	5,090	6,333	4.3	5.3
Pernicious anæmia	3,734	3,908	3.1	3.3
Alcoholism (acute or chronic)	3,933	4,158	3.3	3.5
Meningitis (nonepidemic)	2,782	3,048	2.3	2.6
Cerebral hemorrhage, embolism, thrombosis, and softening	99,376	100,646	83.2	84.9
Hemiplegia, other paralysis, cause not specified	4,035	4,671	3.4	3.9
Diseases of the heart	253,985	253,081	212.7	213.5
Diseases of the arteries, atheroma, aneurysm, etc	24,498	25,446	20.5	21.5
Bronchitis	4,586	4,902	3.8	4.2
Pneumonia (all forms)	96,973	98,657	81.2	83.2
Respiratory diseases other than bronchitis and pneumonia (all forms)	9,415	9,588	7.9	8.1
Ulcer of the stomach and duodenum	7,259	7,360	6.1	6.2
Diarrhea and enteritis	20,813	31,192	17.4	26.3
Diarrhea and enteritis (under 2 years)	14,794	23,294	12.4	19.6
Diarrhea and enteritis (2 years and over)	6,019	7,898	5.0	6.7
Appendicitis	18,113	18,100	15.2	15.3
Hernia, intestinal obstruction	12,539	12,176	10.5	10.3
Cirrhosis of the liver	8,851	8,583	7.4	7.2
Nephritis	104,119	107,619	87.2	90.8
Puerperal septicemia	5,445	5,439	4.6	4.6

[1] Exclusive of stillbirths.
[2] Includes tabes dorsalis (locomotor ataxia) and general paralysis of the insane.

Cause of death	Deaths and death rates in the United States registration area, 1931 and 1930			
	Number		Rate per 100,000 estimated population	
	1931	1930	1931	1930
Puerperal causes other than puerperal septicemia	8, 794	9, 726	7.4	8.2
Congenital malformations and diseases of early infancy	67, 436	72, 216	56.5	60.9
Suicide	20, 088	18, 551	16.8	15.6
Homicide	11, 160	10, 617	9.3	9.0
Accidental and unspecified external causes	100, 133	95, 527	83.8	80.6
Burns (conflagration excepted)[3]	5, 893	6, 523	4.9	5.5
Accidental drowning[3]	7, 545	7, 450	6.3	6.3
Accidental shooting	3, 041	3, 120	2.5	2.6
Accidental falls[3]	20, 356	20, 030	17.0	16.9
Excessive heat (burns excepted)	2, 768	1, 487	2.3	1.3
Other external causes	60, 530	56, 917	50.7	48.0
All other defined causes	95, 546	100, 655	80.0	84.9
Unknown or ill-defined causes	22, 517	24, 861	18.9	21.0
SUPPLEMENTAL				
Mine and quarry accidents	1, 849	2, 560	1.5	2.2
Machinery accidents	1, 630	2, 065	1.4	1.7
Railroad accidents	5, 243	5, 773	4.4	4.9
Collision with automobile	1, 651	1, 760	1.4	1.5
Other railroad accidents	3, 592	4, 012	3.0	3.4
Street car accidents	1, 094	1, 174	.9	1.0
Collision with automobile	419	463	.4	.4
Other street car accidents	675	711	.6	.6
Automobile accidents (excluding collision with railroad trains and street cars)	30, 042	29, 080	25.2	24.5
Other transportation accidents[4]	2, 804	2, 764	2.3	2.3

[3] Includes deaths from this cause where the accident occurred in a mine or quarry, by machinery, or in connection with transportation.
[4] Includes air, motor cycle, and water transportation accidents.

DEATHS DURING WEEK ENDED JANUARY 14, 1933

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Jan. 14, 1933	Corresponding week, 1932
Data from 85 large cities of the United States:		
Total deaths	9, 640	8, 458
Deaths per 1,000 population, annual basis	13.5	12.1
Deaths under 1 year of age	706	930
Deaths under 1 year of age per 1,000 estimated live births[1]	61	53
Deaths per 1,000 population, annual basis, first 2 weeks of year	13.6	12.5
Data from industrial insurance companies:		
Policies in force	69, 167, 602	[illegible]1, 179, 420
Number of death claims	17, 306	15, 052
Death claims per 1,000 policies in force, annual rate	10.0	10.6
Death claims per 1,000 policies, first 2 weeks of year, annual rate	10.8	9.9

[1] 1932, 81 cities; 1931, 78 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended January 21, 1933, and January 23, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended January 21, 1933, and January 23, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Jan. 21, 1933	Week ended Jan. 23, 1932	Week ended Jan. 21, 1933	Week ended Jan. 23, 1932	Week ended Jan. 21, 1933	Week ended Jan. 23, 1932	Week ended Jan. 21, 1933	Week ended Jan. 23, 1932
New England States								
Maine		2	994	181	1	633	0	0
New Hampshire	1	2			1	41	0	0
Vermont	2				3	334	0	0
Massachusetts	18	55	293	29	125	149	2	1
Rhode Island	5	4	53		1	1,056	0	0
Connecticut	1	9	210	7	109	121	0	1
Middle Atlantic States								
New York	67	168	[1] 312	[1] 20	1,106	984	8	6
New Jersey	21	30	474	11	257	104	2	5
Pennsylvania	131	112			422	1,030	11	9
East North Central States								
Ohio	49	88	105	15	544	141	2	1
Indiana	51	69	220	29	16	213	5	6
Illinois	65	170	159	33	169	68	16	8
Michigan	22	46	78	1	372	217	1	6
Wisconsin	4	19	2,887	28	237	89	1	3
West North Central States								
Minnesota	3	17	102	1	421	68	3	1
Iowa	13	28	69			3	5	0
Missouri	32	57	87	7	86	28	5	0
North Dakota	7		2,517		109	86	0	0
South Dakota	1	6	57		4	56	0	0
Nebraska	15	11	11		20	14	1	0
Kansas	6	44	812	4	55	79	1	0
South Atlantic States								
Delaware	2	3	40	1	2	2	0	0
Maryland [2,3]	16	35	928	41	5	11	1	3
District of Columbia	13	19	8	1	2	3	0	0
Virginia	11				178		5	6
West Virginia	20	42	664	64	225	336	0	0
North Carolina	17	38	1,301	23	291	137	4	3
South Carolina	7	12	3,681	89	38	20	0	0
Georgia	17	24	877	126	4	9	0	1
Florida [3]	10	10	76	7		11	0	0

See footnotes at end of table

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended January 21, 1933, and January 23, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Jan. 21, 1933	Week ended Jan. 23, 1932	Week ended Jan. 21, 1933	Week ended Jan. 23, 1932	Week ended Jan. 21, 1933	Week ended Jan. 23, 1932	Week ended Jan. 21, 1933	Week ended Jan. 23, 1932
East South Central States								
Kentucky	11	76	1,04[illegible]			1	1	0
Tennessee	25	51	726	13	2	16	4	4
Alabama [3]	18	6	751	[illegible]	2	17	1	4
Mississippi	[illegible]	[illegible]					2	1
West South Central States								
Arkansas	17	21	17[illegible]	18	18	2	[illegible]	[illegible]
Louisiana [3]	20	5	840	4	7	1	1	1
Oklahoma [4]	16	55	1,07[illegible]	75	1	84	[illegible]	0
Texas [3]	34	80	706	[illegible]	[illegible]0	10	[illegible]	1
Mountain States								
Montana	[illegible]	6	[illegible]	11	344	103	0	[illegible]
Idaho	6		6		14	2	0	1
Wyoming						1	0	0
Colorado	5	9	105		3	6	0	0
New Mexico	11	17	8	200	2	8	1	[illegible]
Arizona		2	18	12			0	0
Utah	2	1	1		5	[illegible]	0	0
Pacific States								
Washington	10	9	12		3	113	2	0
Oregon	2	5	2[illegible]	[illegible]	20	40	1	[illegible]
California [3]	57	49	51		182	[illegible]	1	[illegible]
Total	967	1,6[illegible]2	24,76[illegible]	[illegible]	5,1[illegible]9	7,[illegible]0	101	74

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Jan. 21, 1933	Week ended Jan. 23, 1932	Week ended Jan. 21, 1933	Week ended Jan. 23, 1932	Week ended Jan. 21, 1933	Week ended Jan. 23, 1932	Week ended Jan. 21, 1933	Week ended Jan. 23, 1932
New England States								
Maine	0	0	3	[illegible]	0	0	0	1
New Hampshire	0	1	[illegible]	14	0	1	0	0
Vermont	0	0	29	7	0	26	0	1
Massachusetts	0	[illegible]	384	[illegible]	0	18	0	3
Rhode Island	0	0	10	36	0	0	0	0
Connecticut	0	1	108	8[illegible]	0	1	1	1
Middle Atlantic States								
New York	0	1	7[illegible]8	901	0	1	0	1[illegible]
New Jersey	0	1	2[illegible]3	209	0	0	2	3
Pennsylvania	0	3	9[illegible]8	581	0	0	[illegible]	28
East North Central States								
Ohio	0	0	115	323	3	34	[illegible]	19
Indiana	0	0	110	100	[illegible]	31	2	0
Illinois	2	[illegible]	171	398	9	29	6	14
Michigan	0	1	121	519	0	16	[illegible]	2
Wisconsin	0	3	1[illegible]6	111	1	5	1	2
West North Central States								
Minnesota	0	1	[illegible]3	8[illegible]	0	0	0	0
Iowa	0	1	13	64	23	67	2	0
Missouri	0	0	109	89	0	23	1	1
North Dakota	0	3	26	15	0	1	0	2
South Dakota	0	1	17	7	0	17	3[illegible]	4
Nebraska	1	1	35	15	3	5	0	0
Kansas	0	0	55	74	1	1	2	4
South Atlantic States								
Delaware	0	0	11	8	0	0	0	0
Maryland [2,3]	0	1	113	92	0	0	0	12
District of Columbia	0	0	22	21	0	0	0	3
Virginia	0	1	57		0	--	5	[illegible]
West Virginia	0	0	27	18	0	4	5	7
North Carolina	1	2	61	57	0	1	8	5
South Carolina	0	0	9	11	0	2	0	11
Georgia	0	1	14	32	1	0	5	5
Florida [3]	0	1	17	1	0	0	1	11

See footnotes at end of table

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended January 21, 1933, and January 23, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Jan. 21, 1933	Week ended Jan. 23, 1932	Week ended Jan. 21, 1933	Week ended Jan. 23, 1932	Week ended Jan. 21, 1933	Week ended Jan. 23, 1932	Week ended Jan. 21, 1933	Week ended Jan. 23, 1932
East South Central States:								
Kentucky	1	1	4	121	1	8	5	19
Tennessee	0	0	31	[illegible]	0	16	8	21
Alabama[3]	2	2	12	30	0	16	3	21
Mississippi	1	1	14	23	2	8	2	6
West South Central States:								
Arkansas	0	0	13	14	13	20	2	6
Louisiana[3]	0	1	10	1	1	1	[illegible]	9
Oklahoma[4]	0	0	9	3	1	36	0	2
Texas	0	1	82	[illegible]	14	[illegible]	11	8
Mountain States:								
Montana	0	0	16	4	1	2	0	3
Idaho	0	0	[illegible]	1	0	2	0	0
Wyoming	0	0	2	18	0	0	0	0
Colorado	0	0	2	46	0	4	[illegible]	2
New Mexico	1	0	20	9	0	1		1
Arizona	2	0	14		0	0	0	0
Utah[2]	0	0	11	18	0	0	0	0
Pacific States:								
Washington	0	0	3	39	6	32	0	3
Oregon	1	1	16		12	20	[illegible]	3
California[3]	2	2	203	111	18	21	1	5
Total	14	40	[illegible]	[illegible]	170	101	111	[illegible]

[1] New York City only.
[2] Week ended Friday.
[3] Typhus fever, week ended Jan. 21, 1933, 14 cases: 1 case in Maryland, 1 case in [illegible], 2 cases in Alabama, 1 case in Louisiana, [illegible] cases in Texas, and 1 case in California.
[4] Figures for 1933 are exclusive of Oklahoma City and Tulsa.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of monthly State reports is published weekly and covers only those States from which reports are received during the current week.

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
December, 1932										
Arkansas	5	[illegible]	[illegible]	34	[illegible]	36	0	6	[illegible]	11
Colorado		[illegible]	[illegible]		[illegible]		0	[illegible]	[illegible]	3
Maryland	3	[illegible]	2,411		26	1	1	[illegible]	0	33
Minnesota	[illegible]	[illegible]	[illegible]		[illegible]		1	3	[illegible]	[illegible]
New York	17	[illegible]		[illegible]	[illegible]		13	[illegible]	19	13
North Carolina	5	161	1,405		321	21	2	312	[illegible]	3
Ohio	8	273	2,906		[illegible]		6	[illegible]	[illegible]	40
Pennsylvania	11	[illegible]		1	1,306		17	[illegible]	0	65
South Dakota	1	[illegible]	792		14		1	[illegible]	5	[illegible]
West Virginia	6	121	6,379	[illegible]	622		0	280	3	23

December, 1932	Cases
Anthrax:	
New York	2
Chicken pox:	
Arkansas	204
Colorado	378
Maryland	670
Minnesota	815
New York	3,497
North Carolina	787
Ohio	2,977
Pennsylvania	4,624
South Dakota	108
West Virginia	228
Diarrhea:	
Maryland	2
Diarrhea and enteritis:	
Ohio	17
Dysentery:	
Maryland	1
Minnesota	1
New York	8
Ohio	1
Food poisoning:	
Ohio	12
German measles:	
Maryland	9
New York	129
German measles—Continued:	
North Carolina	7
Ohio	28
Pennsylvania	36
Hookworm disease:	
Arkansas	1
Impetigo contagiosa:	
Colorado	31
Maryland	25
Lead poisoning:	
Ohio	11
Lethargic encephalitis:	
Minnesota	2
New York	8

	Cases
Lethargic encephalitis—Continued	
Ohio	3
Pennsylvania	
Mumps	
Arkansas	[illegible]
Colorado	[illegible]
Maryland	[illegible]
Ohio	191
Pennsylvania	1 [illegible]
South Dakota	10
West Virginia	3
Ophthalmia neonatorum	
Maryland	2
New York	3
North Carolina	1
Ohio	81
Pennsylvania	[illegible]
Paratyphoid fever	
Colorado	1
Minnesota	1
New York	4
Puerperal septicemia	
Ohio	4
Pennsylvania	1[illegible]
Rabies in animals	
Maryland	4
West Virginia	1
Scabies	
Maryland	1
Septic sore throat	
Maryland	
New York	
North Carolina	
Ohio	
South Dakota	
West Virginia	
Tetanus	
Minnesota	
New York	
Ohio	
Pennsylvania	
Trachoma	
Arkansas	
Ohio	
South Dakota	
Trichinosis	
Maryland	
New York	
Pennsylvania	
Tularaemia	
Arkansas	
Colorado	1
Maryland	10
Minnesota	2
New York	1
North Carolina	1
Ohio	18
Tuberculosis—Continued	
Pennsylvania	11
West Virginia	1
Typhus fever	
Maryland	1
New York	1
North Carolina	8
Undulant fever	
Maryland	3
Minnesota	5
New York	[illegible]
North Carolina	1
Ohio	3
Pennsylvania	10
Vincent's angina	
Colorado	3
Maryland	9
New York	11[illegible]
Whooping cough	
Arkansas	33
Colorado	8
Maryland	10[illegible]
Minnesota	13[illegible]
New York	1 [illegible]
North Carolina	10[illegible]
Ohio	307
Pennsylvania	881
South Dakota	14
West Virginia	[illegible]

PLAGUE-INFECTED GROUND SQUIRREL IN CALIFORNIA

The Director of Public Health of California reported January 20, 1933, that plague infection had been proved by animal inoculation in a ground squirrel which was shot on a ranch 20 miles east of Hollister, San Benito County, California. The specimen was received at the State bacteriological laboratory January 12, 1933. The last plague-infected squirrel previously found at this location was shot August 5, 1932.

WEEKLY REPORTS FROM CITIES

City reports for week ended January 14, 1933

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Maine											
Portland	0	9	0	0	5	6	0	1	0	[illegible]	31
New Hampshire											
Concord	0	--	2	0	3	0	0	0	0	[illegible]	19
Nashua	0		0	0	0	0	0	0	0	0	
Vermont											
Barre	0		0	0	0	0	0	1	0	0	3
Burlington	3		0	0	0	0	0	0	0	0	[illegible]
Massachusetts											
Boston	6	59	4	27	49	101	0	12	0	[illegible]	242
Fall River	0	6	4	0	4	16	0	2	1	4	42
Springfield	2	1	0	3	2	11	0	2	0	0	36
Worcester	0	3	0	2	12	21	0	1	0	14	39
Rhode Island											
Pawtucket	0		0	0	0	0	0	0	0	0	20
Providence	2	8	4	0	7	26	0	2	0	10	77
Connecticut											
Bridgeport	0	157	4	11	6	6	1	2	0	1	52
Hartford	0	6	2	3	9	2	0	1	0	1	60
New Haven	0	8	4	6	5	12	0	2	0	3	64
New York											
Buffalo	5	6	8	6	28	47	0	5	1	61	145
New York	49	533	91	344	413	218	0	95	3	80	2 004
Rochester	1	111	1	1	13	37	0	1	0	7	108
Syracuse	0	50	5	3	12	28	0	2	0	2	60
New Jersey											
Camden	0	5	8	0	8	7	0	1	0	0	41
Newark	0	172	3	117	15	4	0	13	0	19	103
Trenton	2	12	1	0	5	22	0	2	0	4	47

City reports for week ended January 14, 1933—Continued.

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Pennsylvania											
Philadelphia	7	110	20	26	59	150	0	26	0	3	528
Pittsburgh	4	18	9	3	10	42	0	5	1	9	148
Reading	2		0	26	2	6	0	2	0	3	20
Scranton	1			0		11	0		0	0	
Ohio											
Cincinnati	1	2	6	0	19	23	0	5	0	0	150
Cleveland	4	184	8	5	14	128	0	9	0	18	166
Columbus	8	7	7	196	7	10	0	4	0	1	80
Toledo	2		0	46	6	31	0	2	0	2	89
Indiana:											
Fort Wayne	4		0	0	1	1	0	0	0	0	26
Indianapolis	5		1	14	19	6	0	4	0	9	
South Bend	0		2	0	0	2	0	1	0	0	10
Terre Haute	0		0	0	2	3	0	0	0	0	24
Illinois:											
Chicago	15	23	18	64	72	247	0	22	0	18	704
Springfield	0		0	0	5	3	0	0	0	0	31
Michigan:											
Detroit	16	16	11	87	33	95	0	20	0	72	283
Flint	1	74	1	4	12	6	0	2	0	1	40
Grand Rapids	0		12	0	3	7	0	1	0	30	44
Wisconsin:											
Kenosha	0		1	0	0	2	1	0	0	8	6
Madison	0			5		1	0		0	4	
Milwaukee	1	41	17	2	22	27	0	4	0	21	136
Racine	0	3	3	0	1	17	0	0	0	7	23
Superior	0		1	0	1	1	0	0	0	3	6
Minnesota:											
Duluth	0		2	0	3	5	0	0	0	13	20
Minneapolis	1		2	154	8	23	0	5	0	7	100
St. Paul	1	8	3	10	3	17	0	1	0	44	50
Iowa:											
Des Moines	7			0		3	1		0	0	39
Sioux City	0			1		0	0		0	1	
Waterloo	0			0		1	0		0	0	
Missouri:											
Kansas City	2	1	5	69	22	49	0	13	0	7	127
St. Joseph	2		1	0	13	2	0	1	0	0	49
St. Louis	22	4	4	5	11	29	0	9	0	3	235
North Dakota:											
Fargo	0		1	1	1	0	0	0	0	0	6
Grand Forks	0		0	9	0	0	0	0	0	0	
South Dakota:											
Aberdeen	4			0		0	0		0	0	
Nebraska:											
Omaha	4		0	2	18	6	1	0	0	0	60
Kansas:											
Topeka	0		0	0	5	4	0	0	0	0	19
Wichita	0		1	0	5	2	0	0	0	0	32
Delaware:											
Wilmington	4		0	0	8	6	0	1	0	0	36
Maryland:											
Baltimore	5	170	18	4	52	65	0	10	0	11	300
Cumberland	0	5	1	0	1	5	0	1	0	0	20
Frederick	1	4	0	0	2	0	0	0	0	0	4
District of Columbia:											
Washington	9	11	8	7	21	21	0	9	0	3	191
Virginia:											
Lynchburg	1		4	0	2	0	0	0	0	0	18
Norfolk	2	8	0	0	7	1	0	0	0	2	34
Richmond	0		8	3	8	8	0	6	0	0	62
Roanoke	1		3	18	4	2	0	0	0	0	18
West Virginia:											
Charleston	1	7	3	0	5	0	0	0	1	0	12
Huntington	8			43		4	0		0	0	
Wheeling	[1] 1		0	113	5	0	0	0	0	6	24
North Carolina:											
Raleigh	0	4	0	1	2	8	0	0	0	0	10
Wilmington	1		1	1	1	0	0	0	0	0	9
Winston-Salem	1	24	0	2	1	8	0	2	0	0	16
South Carolina:											
Charleston	0	882	0	0	4	0	0	3	0	0	24
Columbia	1		0	2	0	0	0	0	0	0	9
Greenville	0		0	0	0	0	0	0	0	0	

[1] Nonresident.

City reports for week ended January 14, 1933—**Continued.**

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Georgia:											
Atlanta	4	56	4	0	4	4	0	4	0	9	------
Brunswick	0		0	0	0	0	0	0	0	0	4
Savannah	1	31	3	0	6	2	0	1	0	0	32
Florida:											
Miami	0	38	0	0	2	2	0	2	0	0	26
Tampa	3	4	4	0	1	0	0	2	0	1	34
Kentucky:											
Ashland	1	44	0	1	0	5	0	0	0	0	-----
Lexington	0	11	0	1	2	0	0	2	0	0	18
Louisville	1	9	2	1	8	9	0	3	0	1	91
Tennessee:											
Memphis	7	---	5	0	5	8	0	7	2	1	101
Nashville	0	-	4	1	8	1	0	3	0	1	45
Alabama:											
Birmingham	3	31	1	3	4	3	0	3	1	6	60
Mobile	1	7	5	0	1	2	0	1	0	0	26
Montgomery	2	2	-----	0	--	2	0		0	0	------
Arkansas:											
Fort Smith	2	-	-----	0		0	0	-	0	0	---
Little Rock	0	-	3	0	6	0	0	3	0	0	14
Louisiana:											
New Orleans	13	13	13	0	14	3	0	10	1	3	140
Shreveport	0		0	0	15	1	0	2	0	0	37
Oklahoma:											
Tulsa	1	--	-----	0	--	1	1	--	0	0	--
Texas:											
Dallas	15	16	11	2	7	10	0	4	0	0	65
Fort Worth	3	------	3	2	5	8	1	3	0	0	47
Galveston	2	-	0	2	3	8	0	0	0	0	17
Houston	13	--	4	12	20	3	1	1	0	0	78
San Antonio	6	3	10	0	8	2	0	18	0	0	87
Montana:											
Billings	0	1	0	1	0	0	0	0	0	0	10
Great Falls	0		0	38	1	0	0	1	0	2	12
Helena	0	87	0	0	0	0	0	0	0	0	9
Missoula	0	155	0	0	4	0	0	0	0	0	13
Idaho:											
Boise	0	-	0	2	3	0	3	0	0	0	9
Colorado:											
Denver	6	99	6	6	13	12	0	3	0	2	80
Pueblo	0	-	2	0	5	1	0	1	0	1	21
New Mexico:											
Albuquerque	2	1	0	0	5	3	0	6	0	0	14
Arizona:											
Phoenix	0		1	0	2	2	0	1	0	0	---
Utah:											
Salt Lake City	0		2	0	1	0	0	0	0	2	35
Nevada:											
Reno	0		0	0	1	0	0	0	0	0	5
Washington:											
Seattle	0			0		5	0	-	0	9	-------
Spokane	0			0		2	0		1	0	---
Tacoma	0		5	0	8	0	0	0	0	2	33
Oregon:											
Portland	0	19	3	0	7	2	1	3	0	0	72
Salem	0	12	-	7		1	0		0	0	--
California:											
Los Angeles	33	142	15	53	38	57	22	22	0	33	366
Sacramento	1	3	1	0	7	0	0	8	0	11	40
San Francisco	1	241	14	0	27	10	0	10	1	41	237

City reports for week ended January 14, 1933—Continued

State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths	
Massachusetts:			
Boston	1	1	0
New York:			
Buffalo	2	0	0
New York	8	5	0
Rochester	0	1	0
Pennsylvania			
Philadelphia	2	0	0
Pittsburgh	1	1	0
Indiana:			
Indianapolis	4	0	0
Illinois:			
Chicago	8	3	0
Minnesota:			
Duluth	1	0	0
Minneapolis	1	0	0
Iowa:			
Des Moines	3	0	0
Sioux City	1	0	0
Missouri:			
St. Joseph	1	0	0
St. Louis	1	0	0
Maryland:			
Baltimore	2	0	0
District of Columbia:			
Washington	1	1	0
Kentucky:			
Ashland	0	0	1
Tennessee:			
Nashville	2	2	0
Alabama:			
Birmingham	1	0	0
Louisiana:			
New Orleans	2	0	0
Idaho:			
Boise	0	0	1
California:			
Los Angeles	0	0	1
San Francisco	2	1	0

Lethargic encephalitis.—Cases: Buffalo, 1; New York, 1; Newark, 1; Philadelphia, 1; Chicago, 1; Baltimore, 1; Nashville, 1.

Pellagra.—Cases: Washington, 1, Birmingham, 3; New Orleans, 1.

Typhus fever.—Cases: Montgomery, 1.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Week ended January 7, 1933.—The Department of Pensions and National Health of Canada reports cases of certain communicable diseases for the week ended January 7, 1933, as follows:

Disease	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				2				1	3
Chicken pox	21		107	218				67	510
Diphtheria		8	28	20				1	68
Erysipelas			4					1	8
Influenza	15		20	1,300				873	2,214
Measles	13	23	69	339				16	466
Mumps				151					173
Pneumonia	6			16					27
Poliomyelitis			4	1					5
Scarlet fever	16	4	75	72					203
Smallpox				3					3
Trachoma									8
Tuberculosis	2	7	34	18					73
Typhoid fever			6		1				15
Undulant fever									
Whooping cough			39		11				

PUERTO RICO

Communicable diseases—Four weeks ended December 31, 1932.—During the four weeks ended December 31, 1932, cases of certain communicable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Bronchitis	10	Mumps	14
Chicken pox	7	Ophthalmia neonatorum	13
Colibacillosis	1	Pellagra	2
Diphtheria	42	Poliomyelitis	6
Dysentery	1,623	Puerperal fever	4
Erysipelas	5	Syphilis	209
Filariasis	4	Tetanus	5
Impetigo contagiosa	1	Tetanus, infantile	4
Influenza	159	Trachoma	1
Leprosy	1	Tuberculosis	446
Malaria	6,664	Typhoid fever	9
Measles	190	Whooping cough	61

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

(NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the Public Health Reports for January 27, 1933, pp. 101-112. A similar cumulative table will appear in the Public Health Reports to be issued February 24, 1933, and thereafter, at least for the time being, in the issue published on the last Friday of each month.)

Cholera

Philippine Islands.—During the week ended January 21, 1933, cholera was reported in the Province of Samar, Philippine Islands, as follows: Catbalogan, 64 cases, 13 deaths; Gandara, 26 cases, 13 deaths; Santa Rita, 17 cases, 9 deaths; Tarangnan, 2 cases, 2 deaths; Villareal, 7 cases, 6 deaths; Wright, 2 cases, 2 deaths; Zumarraga, 3 cases.

Plague

Hawaii Territory.—A plague-infected rat was reported January 10, 1933, at Kukaiau, Hamakua District, Island of Hawaii. The place is about 3 miles from Paauilo, where plague-infected rats were found in December, 1932, and is about 175 miles southeast of Honolulu, Oahu Island.

Smallpox

China—Canton.—During the week ended January 14, 1933, 189 cases of smallpox with 4 deaths were reported in Canton, China.

Egypt.—During the week ended January 14, 1933, 237 cases of smallpox with 46 deaths were reported in Alexandria, Egypt.

During the two weeks ended January 7, 1933, 7 cases of smallpox with 1 death were reported in Cairo, Egypt.

UNITED STATES TREASURY DEPARTMENT

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UNITED STATES PUBLIC HEALTH SERVICE

HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst. Surg. Gen. R. C. WILLIAMS, *Chief of Division*

The PUBLIC HEALTH REPORTS are issued weekly by the United States Public Health Service through its Division of Sanitary Reports and Statistics, pursuant to acts of Congress approved February 15, 1893, and August 14, 1912.

They contain: (1) Current information of the prevalence and geographic distribution of preventable diseases in the United States in so far as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other communicable diseases throughout the world. (2) Articles relating to the cause prevention, or control of disease. (3) Other pertinent information regarding sanitation and the conservation of the public health.

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PUBLIC HEALTH REPORTS

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FURTHER STUDIES ON THE PHARMACOLOGY AND NEUROPATHOLOGY OF CERTAIN PHENOL ESTERS

Interest in the problem of the pharmacologic action of phenol esters arose from the discovery that the wave of so-called ginger paralysis which occurred in many sections of the United States early in 1930 was due to one of the cresols in firm combination with phosphoric acid which had apparently been used as an adulterant. The experiments heretofore had indicated that the singularly specific action on the lower motor neuron exerted by orthocresol in combination with phosphoric acid was not shared by metacresol or paracresol in similar combination with phosphoric acid, and orthocresol alone could exert no such specific action.

An apparently new type of relationship between physiological action and chemical constitution thus presented itself. This is a matter of practical as well as theoretical concern, for some of the phenolic compounds used in therapeutics, such as phenyl salicylate and guaiacol carbonate, belong to the same general class as the orthocresyl phosphoric ester.

A report of recent studies, by United States Public Health Service investigators, on this problem of the relation of the chemical constitution of certain phenol esters to physiologic action and on the character of the nerve lesions produced in laboratory animals by these compounds has just been issued as National Institute of Health Bulletin No. 160.[1]

A series of 11 phenolic esters more or less closely related chemically to triorthocresyl phosphate were subjected to a pharmacological study for the purpose of correlating their behavior in the animal body with certain of their physicochemical properties, such as lipoid solubility and rate of hydrolysis *in vitro* and *in vivo*.

The results of this investigation disclosed that by altering the chemical constitution of the phenolic esters in certain directions it is possible to produce compounds of widely different pharmacologic action, their effects in the animal body varying all the way from the

[1] Further Studies on the Pharmacology of Certain Phenol Esters with Special Reference to the Relation of Chemical Constitution and Physiologic Action, by Maurice I. Smith, principal pharmacologist, E. W. Engel, special expert, and E. F. Stohlman, junior pharmacologist, National Institute of Health, U. S. Public Health Service; and the Histopathology of some Neurotoxic Phenol Esters, by R. D. Lillie, passed assistant surgeon, and Maurice I. Smith, principal pharmacologist, National Institute of Health, U. S. Public Health Service.

purely phenol-like action to the singular specific type of neurotoxic action marked by a long latent interval of "incubation period."

It has also been possible to effect certain variations in the specific neurotoxic action of some of these compounds by definite change in their chemical constitution. In this manner it has been possible to produce in experimental animals three distinct neurological syndromes by means of three different compounds, each affecting specifically certain well-defined physiological units of the nervous system. Thus the phosphoric ester of orthocresol (the "ginger poison") damages the lower motor neuron and produces the clinical picture of an uncomplicated type of toxic peripheral neuritis. The phosphoric ester of phenol produces in certain animal species a rapidly ascending flaccid paralysis with changes in the nervous system not unlike those of Landry's paralysis. A third neurotoxic compound, also characterized by a long latent interval, has been found in the phosphorous ester of orthocresol, this producing a neurological syndrome of spastic paralysis very similar to the phenomenon of decerebrate rigidity which has been long known to physiologists.

In the histopathologic investigations it is shown that the lesions produced by triphenyl phosphate are mainly a degeneration of the nerve cells in the acute type of poisoning and diffuse fatty degeneration of the myelin sheath of the peripheral nerves in the subacute types of poisoning, this lower motor neuron degeneration being of the same category as the more localized degeneration in triorthocresyl phosphate ("ginger") poisoning. The lesions produced by triorthocresyl phosphite are shown to consist of combined system degeneration involving ascending and descending tracts, in addition to the degeneration of the lower motor neuron, which is characteristic of triorthocresyl phosphate action.

THE NEW VENTILATION SYSTEMS OF THE SENATE AND HOUSE CHAMBERS OF THE CAPITOL, WASHINGTON, D. C.*

By LEONARD GREENBURG, *Sanitary Engineer,*[1] *United States Public Health Service,* and J. J. BLOOMFIELD, *Sanitary Engineer, United States Public Health Service*

In 1924, under resolution of the House of Representatives, a committee of five Members of the House was appointed by the Speaker to investigate the ventilation system in that Chamber. On request of the Architect of the Capitol, Mr. David Lynn, a survey of the system was made by the United States Public Health Service, the salient conclusions reached being as follows: [2]

* From the Office of Industrial Hygiene and Sanitation, U. S. Public Health Service.

[1] Now assistant professor of public health, Yale Medical School.

[2] Williams, R. C.: Report to Surgeon General of U. S. Public Health Service (Mar. 8, 1924) in regard to a study on the ventilation of the Hall of the House of Representatives, conducted by Assistant Sanitary Engineer Leonard Greenburg, Physiologist Frederick B. Flinn, Assistant Physical Chemist J. J. Bloomfield, and Associate Bacteriologist E. M. A. Enlows.

1. The Hall of the House of Representatives contained no carbon monoxide.

2. Bacterial pollution was of a minor character, consisting of the usual types of air bacteria having little or no bearing on the problem of ventilation.

3. The dust content of the air was found to be low, the actual number of dust particles being approximately the same as that usually found in homes and offices.

4. The carbon dioxide content of the Hall at no time exceeded 5.5 parts per 10,000 and averaged 3.8 parts. It was therefore concluded that sufficient air change was always taking place in the Chamber.

5. The most significant findings of this study showed the Hall to be subjected to overheating, a condition exceedingly difficult, if not impossible, to control.

6. Without means for the addition of water vapor to the atmosphere, it was impossible to maintain the moisture content of the air of the Hall at any desired point. Over three-quarters of the observations of relative humidity showed less than 30 per cent (winter).

Recommendation was made for strict regulation of the temperature of the incoming air so as to control the temperature of the Hall, and for the provision of satisfactory means to keep the relative humidity of the Chamber between 30 and 50 per cent at all times.

Objectives for new ventilation system. - From 1857, when the present House Chamber was completed, to 1928 the ventilation of the Chambers presented an almost continuous source of controversy. Following the report of the Public Health Service, and after deliberation, it was decided to replace the old systems in both the House and Senate Chambers (a fan supply and fan exhaust system, with updraft) by new systems capable of conditioning the air during both winter and summer. On request of the Architect of the Capitol, the Surgeon General of the Public Health Service, in 1927, called a meeting of a group of ventilation experts to establish the necessary requirements, the personnel being Prof. C.-E. A. Winslow, chairman, Frank Irving Cooper, A. N. Feldman, R. E. Hall, D. D. Kimball, F. R. Still, and Prof. A. C. Willard, with Sanitary Engineer Leonard Greenburg detailed to assist the board. There was formulated a series of objectives, which were included in circular letters by the Architect, sent to companies specializing in the manufacture and instellation of ventilation systems.[3] The letter invited them to prepare plans, specifications, and estimates based on these objectives.

The committee believed that for summer conditions, the plant should be of sufficient capacity to be capable of maintaining in the halls during periods of maximum occupancy a temperature not in

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[3] Congressional Record, First session of Seventieth Congress Vol. LXIX, pt. 1, p. 1067 (Jan. 5, 1928).

excess of 75° F, and a relative humidity not in excess of 55 per cent with outside weather condition of 95° dry bulb and 78° wet bulb The plant should be capable of maintaining in the halls during the winter a temperature of 75° with a relative humidity of 20 to 50 per cent. These conditions should be produced without noticeable drafts and without noticeable odors in any part of the halls The matter of dust and bacteria were not provided for in the requirements, for the reason that it was not regarded as of importance, and in any case, would be taken care of by the operation of the plant

The committee believed that such conditions could be realized only by a system operating on the downward principle, that is, with air flowing from the ceiling toward and out through the floor, with careful provision for proper diffusion.

It was also stated that the system to be installed should be provided with a complete equipment of indicating and recording devices to give indication and record of temperatures and humidities throughout the system and halls.

The ventilation committee stated that the temperatures and humidities to be maintained should be set from time to time by the appropriate committees of the Houses.

The Architect of the Capitol received bids for the design and construction of several systems of ventilation. At later meetings of the Surgeon General's committee the proposed provisions of the systems offered by the different contractors were compared item by item. As a result of these deliberations the contract was awarded to one of the bidders. Work was begun immediately and the installations were completed in December, 1928, for the House, and in August, 1929, for the Senate.

Description of new ventilating systems The new heating and ventilating systems of both halls are of the type generally known as the forced air or plenum supply fan-exhaust system. The complete process is as follows:

Outdoor air is brought to the air-conditioning equipment through the existing fresh-air tunnel. From here it passes through dehumidifiers, which wash the air and regulate its dew point. From the dehumidifiers, the air passes into a mixing chamber, where it is mixed with air returned from the hall (recirculated air). This mixture of air is drawn into the fans, which force it into the system of air ducts. These convey the air to inlets located in the ceiling of the halls and on the side walls of the cloakrooms. After passing downward, the air of the halls is exhausted through openings in the floor, from which a portion is brought to the air-conditioning apparatus to be used again, while the remainder is blown outdoors. Heating coils are located in the air circuit to supply the heat necessary to maintain a temperature of at least 75° in the halls during the coldest winter weather.

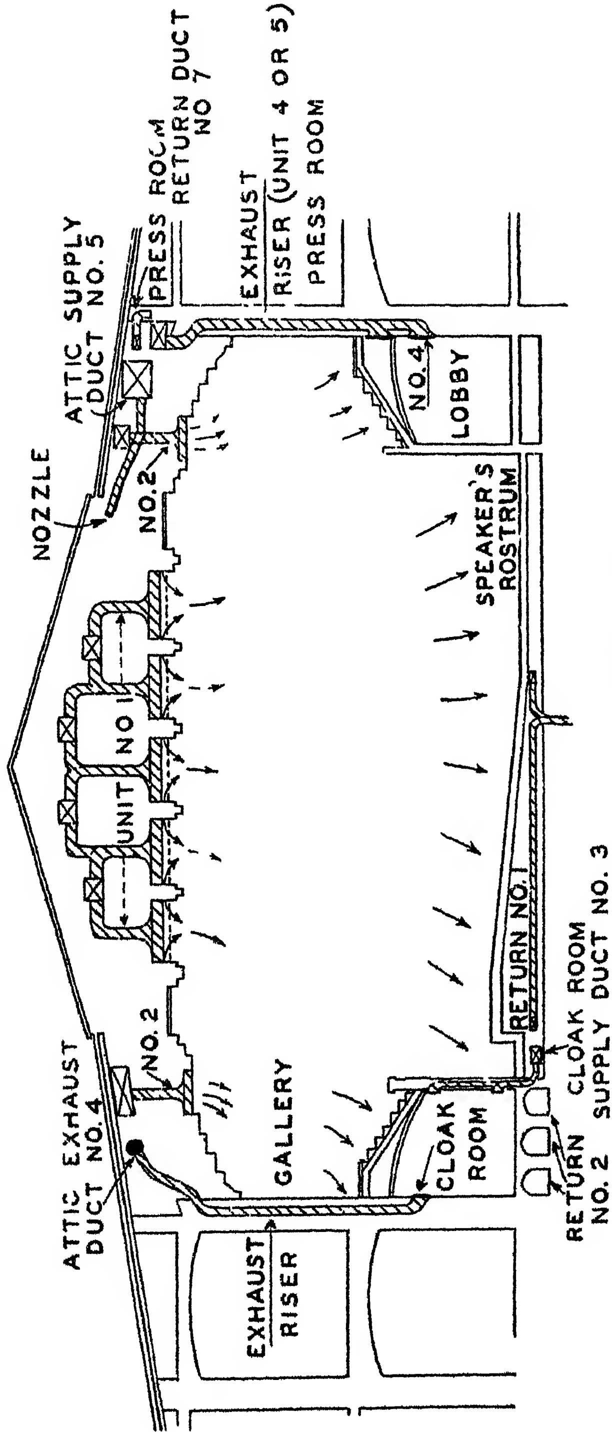

FIGURE 1—Cross section of House Chamber

The heating and ventilation of the House of Representatives (which is similar to the system for the Senate) are accomplished by seven major ventilating units. The design is based on a maximum demand produced by 700 persons on the House floor, 900 persons in the gallery, and at the same time the consumption of 89,600 watts for lighting. The House chamber, including the galleries is 139 feet long and 93 feet wide, with a maximum height of 36 feet. Besides this chamber, the space under the galleries occupied by the cloakrooms and the Speaker's lobby, the four press rooms back of a portion of the gallery, and the glass-covered attic over the chamber, are the only spaces in the building supplied by the system.

Units No. 1 and No. 2 are provided for the ventilation of the hall and gallery spaces. They supply a total of 72,000 cubic feet of air per minute.

The conditioned air is delivered by the fans into the ducts, which convey it to the attic above the ceiling of the hall. From here it passes into a large number of diffusion boxes, the long slotted openings of which are situated inconspicuously beneath the edges of the raised glass panels comprising the ceiling of the hall. The design of the diffusion boxes and their outlets was based on a series of full-scale laboratory studies. Each ceiling panel is provided with two of these air outlets situated on opposite sides of the panel. Their construction is such that the air streams from the opposite sides collide, merge, and diffuse downwards at low velocity to the floor evel, whence they escape into a chamber below the floor. From this space the air is drawn back to the fan to be used again (recirculated air) or to be discharged out of doors.

Units No. 1 and No. 2 are essentially the same; No. 1, however, is designed to supply the central portion of the hall, while No. 2 supplies the gallery. The provision of such separate systems yields a very flexible design, which can take account of the variable occupancy of the House floor and gallery. Another difference between units No. 1 and No. 2 lies in the fact that in the latter a portion of the air after passing downwards through the gallery is exhausted by unit No. 4. This arrangement prevents air from spilling over the balcony to the main floor.

Air supply for the cloakrooms and lobby is furnished by unit No. 3. This unit is not provided with a separate air-conditioning apparatus, but instead draws 6,200 cubic feet of air per minute from the conditioning equipment of unit No. 1. The air is removed from the cloak rooms by unit No. 4, through registers located on the walls near the ceiling level, and discharged out of doors or into unit No. 5, for the attic. Unit No. 4 consists of an exhaust fan of 18,000 cubic feet per minute capacity. By the removal of a larger quantity of air from the cloakrooms than is supplied thereto by its supply fan, air is caused to

flow into the cloakrooms from the House floor. In this manner the smoke in the cloakrooms is effectually prevented from gaining access to the House floor.

Unit No. 5, located in the attic space, is provided for the purpose of either cooling this space during the summer or heating it in the winter. It is so arranged that it can draw air from three sources - first, from the same source as unit No 4, that is, from the cloakrooms; secondly, from the attic space itself; and thirdly, from out of doors. Because of the high rate of heat exchange through the glass roof of the building, such special provisions are required to minimize heat loss. The provision of suitable attic temperatures also makes it possible to control the temperature of the air being supplied through the metal ducts in the attic to the House and gallery.

Unit No 6 has been provided for the cooling of the condenser water used in the refrigerating machine. The water used in the refrigerating machine is broken up into spray in a spray chamber through which unit No. 6 draws 19,000 cubic feet of outdoor air per minute.

For the conditioning and ventilation of the air of the press rooms there is provided a separate unit capable of handling 7,000 cubic feet of air per minute. This unit (No. 7), situated in the attic, takes its supply of air from out of doors, completely washes and conditions it, and distributes the air into four press rooms, which are located at the rear of the press gallery.

It was the opinion of the committee, as well as of the contractor, that the use of variable speed controls on the fans might, under certain conditions, serve to upset the equilibrium of the system, and therefore the fans were provided with constant and unalterable speed control.

In a system such as the one at hand, the production of air at the desired temperature and humidity is achieved by dew-point regulation. The air is saturated with water vapor by passage through a spray of water at the proper temperature. The temperature of this spray is such that, when the air is later raised to the desired room temperature, it will then have the desired humidity percentage. For example, suppose it is desired to produce a conditioned atmosphere of 75° and 40 per cent relative humidity. The dew point [1] tables show that at 75° and 40 per cent relative humidity the dew point is 49°. The air therefore is sprayed with water at 49° temperature until saturated, after which it is heated to 75°, when it will have the desired relative humidity of 40 per cent.

The temperature of the refrigerated water used in the spray chamber is controlled by regulation of the refrigerating machine. It is, however, difficult to maintain the desired dew point solely by refrigeration regulation. Use is made, therefore, of the dissimilarity of the tempera-

[1] The temperature at which air is completely saturated with water (100 per cent relative humidity) is called the dew point.

tures and humidities of the outdoor and recirculated air. By slightly varying the proportions of the air from these two sources a constant dew point may easily be maintained. This is accomplished by the provision of a direct and a reverse acting thermostat placed in the spray chamber. These actuate the dampers which control the proportions of recirculated and outdoor air in the final mixture.

In order to regulate and maintain the desired temperature, a thermostat is also located in the return air duct leading from the hall and connected to a set of dampers which control the quantity of dehumidified air delivered to the system. In addition the thermostat is connected to the steam-heating coils in the recirculated air circuit. When the closing of the dampers regulating the air supply to the dehumidifier has not succeeded in preventing overcooling, the heating coils of the recirculation circuit are turned on and the air is warmed to the desired temperature.

The third controlling member in this ventilation system is a static pressure regulator located in the discharge side of the fan. This device is provided for the purpose of maintaining the delivery of a constant air volume to the building. If the thermostat controlling the volume of dehumidified air being supplied should close the dampers in front of the dehumidifier, the static pressure regulator would counterbalance this action by a proportionate opening of the recirculation air damper, thus delivering a total volume of air equal to that originally supplied. If the damper opening on the dehumidifier is increased, a reverse action would be produced by the static pressure regulator.

In order to prevent the water in the spray chamber from freezing, a double row of heating coils is placed in the air circuit at a point preceding the spray chamber. These heaters are controlled by a 2-step thermostat located in the outdoor air-supply circuit. In cold weather, at a temperature of 35° to 40°, the first row of these heaters goes into action, thus preventing the freezing of the coils. At about 20° the second row of heating coils begins to function.

The refrigeration of the water for the spray chambers is produced by a refrigerating machine operating with the refrigerant at all times under a vacuum. In this machine the refrigerant vaporizes and thereby exerts its cooling action in an evaporator. After leaving the evaporator, the refrigerant is pumped over to the condenser side of the machine, where it is condensed to the liquid state by means of the cooling water delivered from unit No. 6. The water used in the spray chamber of the dehumidifiers circulates about the tubes in the evaporator of the refrigerating machine. Here the water is cooled to the desired temperature and then pumped to the dehumidifiers, where it is sprayed into the passing air stream. The machine employed at the House of Representatives has a capacity equivalent to the cooling produced by 196 tons of ice daily.

In the design and construction of this system of ventilation care has been exercised to prevent the production of noise due to either the machinery or the flow of air in the ducts. Isolation pads with wooden framework have been placed under the fans and motors to which they are securely bolted. This framework is then set upon a thick cork pad which rests directly on a concrete foundation. Throughout the installation the production and propagation of noise through the duct work has been prevented by means of sound deadeners and soundproofing materials.

On all of the pipes conveying steam, insulation in the form of 85 per cent magnesia is provided. On all cold-water piping standard thickness of cork is used. Cork insulation is also provided on the outside of the dehumidifiers and cork covering and weatherproofing are provided on those air ducts which had to be located on the roof of the building.

In order that the engineer, stationed in the apparatus room, may at all times know the temperature of the air at various points throughout the building, a 16-point electric temperature recording apparatus is provided. The thermojunctions of this instrument are located at critical points in the system.

As the installation in the Senate Chamber is similar to that in the House, no detailed account of it is given in this paper.

Operating tests in the House Chamber.—Detailed studies of the operation of these systems were conducted. In general, they consisted in the determination of dry bulb temperature, relative humidity, air motion, and the quantity of carbon dioxide present in the atmosphere. These observations were made at selected test points in the various occupied spaces before, during, and after occupancy of the Chamber.

The first series of studies in the House of Representatives were made on the afternoon of January 3, 1929. Nine locations were selected as test points, 3 in the gallery, 3 on the House floor, and 1 each in the Speaker's lobby, the Democratic and the Republican cloakrooms. In this series one observation was made at each test point. The second series was made the next day, starting at 11 a. m., one hour before Congress convened. Three rounds of observations were made at each test point. The average results of the tests in the Chamber are given in Table 1.

TABLE 1. *Summary of average observations, January 3 and 4, 1929*

Date	Location	Temperature °F.	Relative humidity per cent	Carbon dioxide (parts per 10,000)	Air velocity, feet per minute
Jan. 3, 1929	Gallery	72.5	34	5.3	33
	Floor	73.0	34	4.3	36
Jan. 4, 1929	Gallery	71.8	39	4.3	31
	Floor	72.4	37	4.0	46

An interpretation of these results is possible by use of the "effective temperature" scale, an empirically determined index dependent on the comfort sensations of human subjects. Effective temperature may be defined as that temperature of saturated air which, moving at a velocity of 15 to 25 feet per minute, would produce the same sensation of warmth or cold as that produced by the combination of temperature, humidity, and air motion under observation. The effective temperature chart was determined from a series of studies formulated by the American Society of Heating and Ventilating Engineers in which radiant heating was not employed and therefore applies to studies made in such a system as the one at hand. Although it does not differentiate between the relative amounts of heat lost by conduction, radiation, and evaporation, the use of this index is applicable in the present instance, since we are dealing with small changes in temperature and humidity very close to the optimum for comfort and not with conditions widely spread over the whole chart. As a result of a large series of studies, the degree of comfort associated with various effective temperatures was established for both winter and summer seasons. These comfort zones have been superimposed on the effective temperature chart,[5] a copy of which is reproduced in Figure 2.

If the average results of the floor observations of Table 1 are used to determine the degree of comfort from the effective temperature chart, it will be noted that the observations of both days yielded 91 per cent comfort on the warm side of the winter comfort zone; but it should be borne in mind that we are dealing with a group of persons who average middle age and many of whom, as a rule, desire a warm environment. Some of these persons are from the Southern States and are relatively more sensitive to cool conditions. The relatively higher air motion provided on the House floor (35 feet per minute as compared with the usual 15 to 25 feet per minute), as well as the absence of sources of radiant heating, also makes it desirable to keep the environment at a higher temperature than that ordinarily considered the optimum.

The first two series of tests in the House thus indicated that the system was capable of constantly maintaining the desired atmospheric conditions throughout the course of the entire day. In addition, the studies disclosed that at all times a sufficient air change was being provided. The studies of air velocity, on the other hand, indicated the existence, at certain points on the House floor, of high air velocities.

Baetjer[6] showed that the threshold limit for perception of air currents at the temperature maintained in the House Chamber, lies

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[5] Yaglou, C. P., and Drinker, Philip. The Comfort Zone. Climate and Clothing. Jour. of Ind. Hyg., Vol. X, No. 10, p. 350, December 1928.

[6] Baetjer, Anna M. Threshold air currents in ventilation. Amer. Jour. of Hyg., Vol. IV, No. 6, p. 650, November, 1924.

between 15 and 51 feet per minute, depending on the point of the face whereon the air current impinges. The threshold limit for perception is 15 feet per minute on the eyes and 51 feet per minute on the cheeks. It seems advisable to choose a middle ground, and accordingly, a velocity of 25 to 35 feet per minute has been selected as the desirable value.

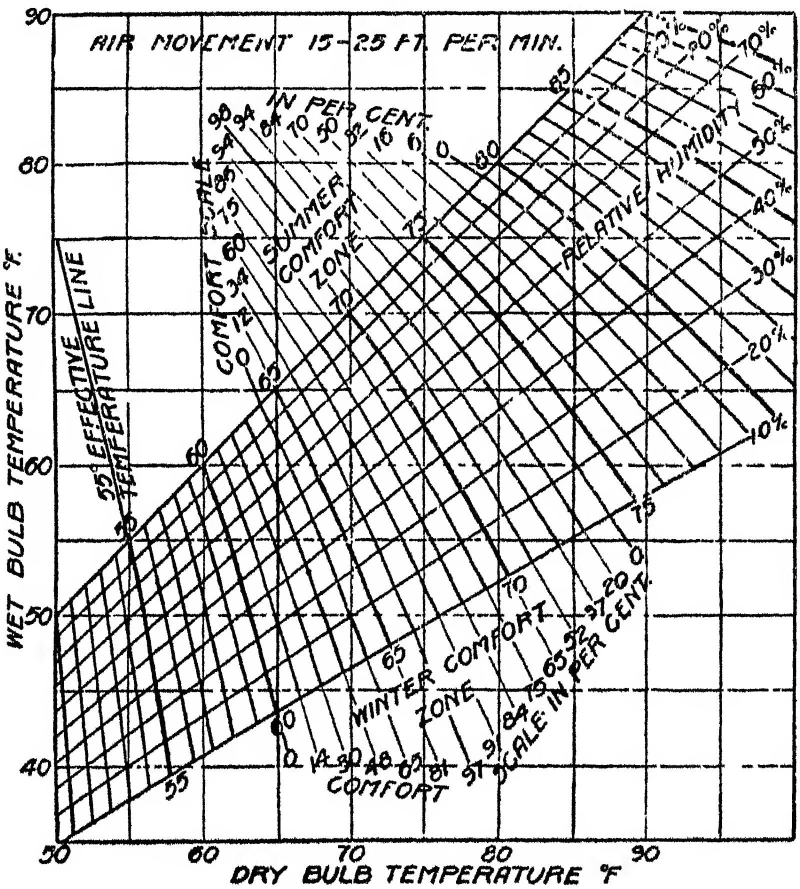

Figure 2 Effective temperature chart with superimposed comfort zone

In view of the fact that the velocities found in certain parts of the chamber were well above this limit, it was decided that the problem of drafts required further attention. Accordingly, 37 different points on the floor of the hall were selected for further study. Observations on January 5, yielded an average air movement of 57 feet per minute, with a maximum of 118 feet per minute. In fact, 91 per cent of the observations yielded velocities in excess of 35 feet per minute. An iso-velocity chart was prepared from these observations. (Fig. 3.)

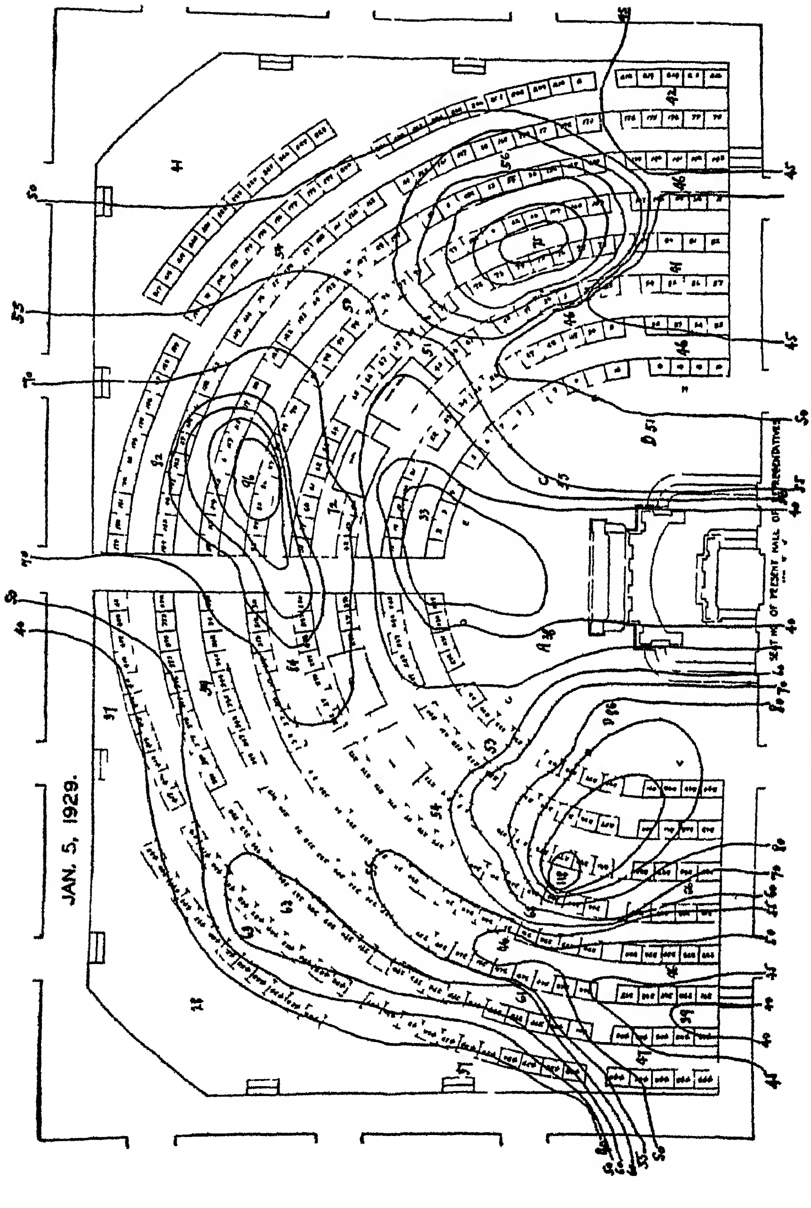

FIGURE 3.—Iso-velocity chart of House Chamber

This chart disclosed the presence of three distinct areas of high air movement.

It was apparent that steps should be taken to eliminate these high velocities, and, accordingly, the contractor made adjustments in the dampers of the attic ducts and in those of the return-air chamber. Further tests were made on January 7 and 8, which again disclosed the necessity for minor adjustments. This process was continued until tests showed that the problem of regulation of air movements was satisfactorily solved.

The preceding tests were all conducted during the winter months and did not provide information as to the functioning of the system in the summer. It was deemed essential to obtain summer operating data as well as to ascertain once again the distribution of air velocities on the floor. Accordingly, tests, identical with those previously described, were conducted on June 11 and 12, 1929. The minimum temperature in the chamber was 74°, the maximum 76°, and the average 74.8°. The relative humidity ranged from 50 to 64 per cent and averaged 59 per cent. These average results yielded an effective temperature of 71°, which corresponds with a 98 per cent degree of comfort for summer conditions. (Fig. 2.) The velocity results gave a minimum of 14, a maximum of 35, and an average of 27. It is obvious that the system was functioning in a highly satisfactory manner.

Three years later (April, 1932), a restudy of the ventilation system was made. The first step was to examine carefully the numerous pieces of apparatus and the record charts of the operating engineer, in order to note whether any changes had been made in the various ventilating units during the three years that had elapsed since the previous study. The next step was to conduct a detailed study of the ventilation conditions on the House floor. On April 12, 60 observations were made at the various test points on the floor of the hall of the House of Representatives. These observations began at 9.45 a. m. and terminated at 3.20 p. m., thus yielding results of ventilating conditions before and during the occupancy of the chamber. The results of these observations are summarized in Table 2.

TABLE 2. *Summary of results of ventilation observations, April 12, 1932*

	Dry bulb temperature °F		Per cent relative humidity		Air velocity in feet per minute		Per cent comfort	
	A. m.	P. m.	A. m.	P. m.	A. m.	P. m.	A. m.	P. m.
Minimum	72.0	71.0	40	37	8	15		
Maximum	74.0	73.8	43	41	42	62		
Average	72.7	71.8	42	38	24	30	80	95

[1] Warm side of winter comfort zone.

From this table it will be noted that the system of ventilation was maintaining a rather constant dry bulb temperature throughout the day. The minimum temperature was 71.0° (p. m.), and maximum 74.0° (a. m.), and the average temperature was found to be 72.7° in the morning and 71.8° in the afternoon. The relative humidity ranged from a minimum of 37 to a maximum of 43 and averaged 40 per cent for the entire day.

Further examination of the table shows that the degree of comfort associated with the atmospheric conditions, as determined from the comfort chart (Fig. 2), was 86 per cent comfortable in the morning and 95 per cent in the afternoon, when the House was in session. As discussed earlier in this report, it is our feeling that an environment corresponding to a degree of comfort between 84 and 91 per cent on the warm side of the comfort zone is one to be desired for persons of the average age of Members of the House.

The results of the air velocity studies yielded a minimum of 8, a maximum of 62, and an average velocity for the day of 27 feet per minute. In order to obtain a more complete picture of the velocity of the air currents on the floor of the hall, Table 3 has been prepared.

TABLE 3.—*Distribution of velocity observations by groups, April 12, 1932*

[Velocity in feet per minute]

Less than 20	20 to 24	25 to 29	30 to 34	35 to 39	40 and over	Total observations
16	12	10	10	6	6	60

From this table it is obvious that 48, or 80 per cent, of the velocity determinations are less than 35 feet per minute and that only 6 observations exceeded 40 feet per minute. These higher observations all occurred in the afternoon when the House was in session and in the vicinity of doors, at a time when they were being constantly opened and closed. In this connection it was noted that the cloak room doors are kept open throughout the session of the House of Representatives, a practice which tends to create localized drafts in the vicinity of these doors.

From these observations one may conclude that the air movement in the House Chamber is satisfactory.

Tests of ventilation system of Senate.—Similar series of tests conducted at different times in the Senate Chamber indicated that the system in the Senate Chamber was also functioning in an entirely satisfactory manner.

Throughout the course of these studies both before and after the installation of the new system the writers have received unfailing support from the Architect of the Capitol, to whom acknowledgment is made.

CONCLUSIONS

As a result of the study of the ventilation systems of the House and Senate Chambers, the following conclusions are reached:

1. The new ventilation system is capable of maintaining a desired temperature throughout the course of the whole day.

2. It is possible to regulate and maintain the desired moisture content of the air.

3. It is possible to maintain an atmosphere possessing a very high degree of comfort at all points in the Chambers.

4. Adequate air change is taking place in the Chambers at all times. It is certain, as a result of this, that body odors and carbon dioxide will never constitute a ventilation problem.

5. The variations in air motion at different points on the floors are within satisfactory limits and should serve to add to the comfort of the occupants of the Senate and House floors by the very reason of the slight variability that exists.

6. It is the conclusion of the investigators that the new systems of ventilation of the House and Senate Chambers are satisfactory, and that with careful maintenance and operation, atmospheric conditions in the Chambers should be beyond criticism.

COURT DECISION RELATING TO PUBLIC HEALTH

Death from cerebrospinal meningitis held compensable under Federal longshoremen's and harbor workers' compensation act.—(U. S. Circuit Court of Appeals, Ninth Circuit: Todd Dry Docks, Inc., et al. *v.* Marshall, Deputy Commissioner, et al., 61 F. (2d) 671; decided Nov. 7, 1932.) A vessel from the Philippine Islands arrived at Seattle with several cases of cerebrospinal meningitis among the steerage passengers. After the arrival of the ship, a pipe fitter, in pursuance of his employment, went on board and worked thereon for several days. A week after finishing such work he died of cerebrospinal meningitis, and an award under the Federal longshoremen's and harbor workers' compensation act in favor of his widow and minor child was upheld by the United States district court.

On appeal the question presented to the circuit court of appeals was whether the disease was the result of an injury within the meaning of the compensation act. Such act defined "injury" as follows:

> The term "injury" means accidental injury or death arising out of and in the course of employment and such occupational disease or infection as arises naturally out of such employment or as naturally or unavoidably results from such accidental injury, * * *.

The contention of the appellants was that the infection must be an occupational one, that is, that the phrase of the section dealing with

disease should be construed as though it read "and such occupational disease or [occupational] infection as arises naturally out of such employment." But the appellate court said that it saw no reason for thus limiting the plain language of the act and affirmed the action of the lower court, declaring that it was satisfied "that the death of the employee in the case at bar resulted from an infection arising naturally out of such employment and that Congress employed the phrase under discussion to set at rest the question which had been considered by the courts as to whether or not such an infection was the result of an accident or was an accidental injury compensable under the workmen's compensation laws."

DEATHS DURING WEEK ENDED JANUARY 21, 1933

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Jan. 21, 1933	Corresponding week, 1932
Data from 85 large cities of the United States:		
Total deaths	9,189	8,039
Deaths per 1,000 population, annual basis	12.9	11.5
Deaths under 1 year of age	697	622
Deaths under 1 year of age per 1,000 estimated live births [1]	60	52
Deaths per 1,000 population, annual basis, first 3 weeks of year	13.3	12.2
Data from industrial insurance companies:		
Policies in force	69,051,695	74,199,865
Number of death claims	17,168	15,011
Death claims per 1,000 policies in force, annual rate	13.0	10.6
Death claims per 1,000 policies, first 3 weeks of year, annual rate	11.3	10.1

[1] 1933, 81 cities; 1932, 78 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended January 28, 1933, and January 30, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended January 28, 1933, and January 30, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Jan. 28, 1933	Week ended Jan. 30, 1932	Week ended Jan. 28, 1933	Week ended Jan. 30, 1932	Week ended Jan. 28, 1933	Week ended Jan. 30, 1932	Week ended Jan. 28, 1933	Week ended Jan. 30, 1932
New England States:								
Maine	1	6	700	159	1	651	0	1
New Hampshire		1	1			30	0	0
Vermont	1					197	0	0
Massachusetts	30	68	111	35	130	319	3	0
Rhode Island	5	11	71	1	1	787	0	0
Connecticut	6	6	270	3	67	179	0	1
Middle Atlantic States:								
New York	71	112	[1] 138	[1] 39	1,550	1,200	1	6
New Jersey	31	32	230	16	413	115	1	5
Pennsylvania	121	100			584	1,589	2	10
East North Central States:								
Ohio	61	159	375	60	784	500	2	5
Indiana	50	53	107	57	6	106	3	12
Illinois	63	120	158	52	147	75	21	8
Michigan	28	46	64	11	492	223	2	2
Wisconsin	4	18	1,522	19	164	181	2	3
West North Central States:								
Minnesota	8	11	2	1	610	21	0	0
Iowa	10	19				4	1	0
Missouri	40	55	21	1	154	38	2	5
North Dakota		1	655		112	5	1	0
South Dakota	5	10	17	3	11	61	0	0
Nebraska	12	10	132	40	9	21	1	0
Kansas	24	47	350	16	104	43	2	2
South Atlantic States:								
Delaware	2	4	14			1	0	0
Maryland [2]	8	55	434	25	1	34	7	2
District of Columbia	6	18	5	1	2		1	2
Virginia	28				329		1	
West Virginia	14	28	253	58	333	270	1	0
North Carolina	21	47	827	30	334	146	1	0
South Carolina	10	17	3,092	508	35	28	0	3
Georgia	7	21	676	84	1	5	0	1
Florida	7	13	183	2	18	9	0	0

See footnotes at end of table.

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Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended January 28, 1933, and January 30, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Jan. 28, 1933	Week ended Jan. 30, 1932	Week ended Jan. 28, 1933	Week ended Jan. 30, 1932	Week ended Jan. 28, 1933	Week ended Jan. 30, 1932	Week ended Jan. 28, 1933	Week ended Jan. 30, 1932
East South Central States:								
Kentucky	22	39	305		17	84	2	3
Tennessee	15	31	467	78	6	13	6	2
Alabama	15	24	312	72	5	5	2	2
Mississippi	1	20					0	1
West South Central States:								
Arkansas	7	7	645	27	8	2	1	0
Louisiana	16	46	124	19	24	20	0	1
Oklahoma [3]	29	32	554	119		120	1	0
Texas [4]	107	131	448	72	73	21	1	0
Mountain States:								
Montana	1	1	832	265	152	80	0	1
Idaho	7		1		9	1	0	0
Wyoming				4	17	2	0	0
Colorado	3	11	65		2	14	1	1
New Mexico	7	13	3	3	8	21	1	0
Arizona	12		22	32	1	2	0	2
Utah [2]	6		2		2	1	0	1
Pacific States:								
Washington	14	8	6		2	383	0	0
Oregon	5	2	243	121	34	23	1	0
California [4]	46	66	312	225	233	319	5	4
Total	987	1,616	14,839	2,567	6,965	7,952	76	86

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Jan. 28, 1933	Week ended Jan. 30, 1932	Week ended Jan. 28, 1933	Week ended Jan. 30, 1932	Week ended Jan. 28, 1933	Week ended Jan. 30, 1932	Week ended Jan. 28, 1933	Week ended Jan. 30, 1932
New England States:								
Maine	4	0	24	32	0	0	0	4
New Hampshire	0	0	51	30	0	0	0	3
Vermont	0	0	16	7	0	6	0	0
Massachusetts	0	0	378	490	0	3	5	3
Rhode Island	0	0	34	45	0	0	0	0
Connecticut	0	0	117	102	2	6	1	1
Middle Atlantic States:								
New York	3	7	823	965	0	4	8	21
New Jersey	0	1	307	220	0	0	3	5
Pennsylvania	0	0	961	617	0	0	2	23
East North Central States:								
Ohio	0	2	689	538	1	49	12	12
Indiana	1	0	129	117	5	25	5	1
Illinois	1	5	523	432	17	5	3	0
Michigan	0	2	470	331	0	3	2	10
Wisconsin	0	2	172	111	7	0	3	0
West North Central States:								
Minnesota	0	0	82	105	0	3	2	2
Iowa	0	0	36	67	31	81	4	2
Missouri	0	0	88	88	0	20	1	2
North Dakota	5	0	11	18	1	11	0	1
South Dakota	0	0	10	13	4	14	11	2
Nebraska	0	1	38	36	39	5	1	1
Kansas	1	0	64	67	0	3	0	2
South Atlantic States:								
Delaware	0	0	10	16	0	0	1	0
Maryland [3]	0	1	81	129	0	0	1	4
District of Columbia	0	0	23	18	0	0	1	0
Virginia	2	1	55		0		14	
West Virginia	0	0	41	51	0	1	5	12
North Carolina	0	0	40	55	2	5	4	14
South Carolina	0	0	3	12	4	0	0	12
Georgia	0	0	16	17	1	0	6	11
Florida	0	0	8	4	0	2	2	3

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended January 28, 1933, and January 30, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Jan 28, 1933	Week ended Jan 30, 1932	Week ended Jan 28, 1933	Week ended Jan 30, 1932	Week ended Jan. 28, 1933	Week ended Jan. 30, 1932	Week ended Jan 28, 1933	Week ended Jan. 30, 1932
East South Central States:								
Kentucky	1	0	54	108	0	4	0	23
Tennessee	1	0	51	62	0	16	2	17
Alabama	2	0	28	34	0	18	0	8
Mississippi	0	1	16	15	2	27	3	5
West South Central States:								
Arkansas	1	0	27	3	13	3	8	1
Louisiana	2	1	7	17	8	3	8	14
Oklahoma [3]	1	1	27	44	17	80	5	23
Texas [4]	0	0	68	62	32	16	8	12
Mountain States:								
Montana	0	1	7	10	0	0	1	0
Idaho	0	0	3	7	15	2	0	0
Wyoming	0	0	8	11	0	0	0	1
Colorado	0	1	25	38	0	6	0	0
New Mexico	0	1	12	11	0	3	1	1
Arizona	5	0	10	8	0	0	0	1
Utah [2]	0	1	9	9	0	0	0	0
Pacific States:								
Washington	0	0	32	45	15	12	5	2
Oregon	0	0	17	30	6	8	4	1
California [4]	3	1	204	123	23	8	9	1
Total	33	30	5,020	5,418	245	451	157	261

[1] New York City only.
[2] Week ended Friday.
[3] Figures for 1933 are exclusive of Oklahoma City and Tulsa.
[4] Typhus fever, week ended Jan. 28, 1933, 4 cases - 3 cases in Texas and 1 case in California

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week:

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
December, 1932										
Alabama	6	160	25,656	66	7	12	2	161	6	15
Idaho	1	16	224		65		2	50	60	3
Illinois	60	292	992	3	254		6	1,756	5	45
Louisiana	5	89	22,361	59	12	13	2	40	22	42
Montana	1	5	15,788		1,289		1	55	7	6
New Mexico	1	57	2,402	1	3		0	85	0	10
Oklahoma [1]	1	148	9,622	24	8	2	2	173	11	14
Oregon		5	5,693		181		1	99	16	5
Rhode Island		8	60		19		0	159	0	1
Virginia	6	164	23,913	19	728	8	3	368	5	49
Wisconsin	3	39	9,011		1,070		4	288	11	11

[1] Exclusive of Oklahoma City and Tulsa.

December, 1932

Disease and State	Cases
Chicken pox:	
Alabama	143
Idaho	59
Illinois	2,100
Louisiana	24
Montana	318
New Mexico	51
Oklahoma [1]	112
Oregon	207
Rhode Island	153
Virginia	389
Wisconsin	2,153
Dysentery:	
Illinois (amebic)	1
Illinois (bacillary)	4
Louisiana	5
Oklahoma [1]	4
Dysentery and diarrhea:	
Virginia	56
Food poisoning:	
New Mexico	1
German measles:	
Illinois	14
Montana	40
Rhode Island	5
Wisconsin	10
Hookworm disease:	
Louisiana	4
Impetigo contagiosa:	
Illinois	1
Montana	17
Oklahoma [1]	1
Oregon	75
Jaundice, epidemic:	
Oregon	[illegible]
Lead poisoning:	
Illinois	5
Lethargic encephalitis:	
Alabama	4
Illinois	11

	Cases
Lethargic encephalitis—Continued.	
Louisiana	1
Montana	3
Oregon	1
Ludwig's angina:	
Illinois	1
Milk sickness:	
New Mexico	1
Mumps:	
Alabama	143
Idaho	50
Illinois	187
Louisiana	2
Montana	18
New Mexico	19
Oklahoma [1]	23
Oregon	12
Rhode Island	34
Wisconsin	304
Ophthalmia neonatorum:	
Illinois	6
New Mexico	1
Rhode Island	1
Paratyphoid fever:	
Idaho	2
Illinois	1
Virginia	1
Puerperal septicemia:	
Illinois	3
New Mexico	1

	Cases
Rabies in animals:	
Illinois	13
Louisiana	2
Rocky Mountain spotted fever:	
New Mexico	1
Scabies:	
Montana	2
Oklahoma [1]	2
Oregon	63
Septic sore throat:	
Idaho	3
Illinois	25
Louisiana	3
Montana	21
New Mexico	1
Oklahoma [1]	42
Oregon	4
Rhode Island	1
Virginia	27
Tetanus:	
Illinois	2
Louisiana	6
Oklahoma [1]	1
Trachoma:	
Illinois	1
Louisiana	1
Oklahoma [1]	2
Trench mouth:	
Oklahoma [1]	2
Oregon	2

	Cases
Trichinosis:	
Illinois	2
Tularaemia:	
Illinois	76
Oklahoma [1]	2
Virginia	56
Wisconsin	1
Typhus fever:	
Alabama	14
Louisiana	3
Undulant fever:	
Illinois	1
Montana	2
Oklahoma [1]	1
Virginia	1
Vincent's angina:	
Illinois	38
New Mexico	1
Oklahoma [1]	1
Oregon	5
Whooping cough:	
Alabama	142
Idaho	1
Illinois	197
Louisiana	57
Montana	11
New Mexico	20
Oklahoma [1]	110
Oregon	18
Rhode Island	123
Virginia	443
Wisconsin	238

WEEKLY REPORTS FROM CITIES

City reports for week ended January 21, 1933

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	0	17	1	1	12	1	0	1	0	11	47
New Hampshire:											
Concord	0		2	0	4	0	0	0	0	0	19
Nashua	0		0	0	0	0	0	0	0	0	
Vermont:											
Barre	0		0	1	0	0	0	0	0	0	4
Burlington	0		0	0	0	1	0	0	0	1	6
Massachusetts:											
Boston	13	30	3	34	59	86	0	12	0	64	306
Fall River	1	1	2	1	12	9	0	3	0	13	51
Springfield	1	4	1	7	1	8	0	1	0	1	31
Worcester	5		0	7	9	28	0	2	0	6	59
Rhode Island:											
Pawtucket	0		0	0	0	0	0	0	0	0	22
Providence	4	7	7	0	13	11	0	2	0	18	65
Connecticut:											
Bridgeport	0	66	2	8	7	13	0	0	0	5	50
Hartford	0	21	0	3	3	1	0	0	5	5	17
New Haven	0	17	3	0	13	10	0	0	0	8	63
New York:											
Buffalo	3		5	6	27	48	0	10	0	56	135
New York	54	312	68	417	300	231	0	109	4	86	1,718
Rochester	1	61	3	2	12	27	0	1	0	10	104
Syracuse	1	104	2	5	7	28	0	0	0	4	53
New Jersey:											
Camden	3		0	0	6	15	0	0	0	0	27
Newark	6	104	3	129	11	21	0	10	0	18	148
Trenton	1	24	1	7	6	28	0	1	1	0	35
Pennsylvania:											
Philadelphia	5	62	16	16	54	182	0	37	0	4	531
Pittsburgh	6	6	3	8	10	44	0	9	0	22	150
Reading	0		0	45	9	15	0	0	0	3	23
Scranton	0			1		20	0		0	0	
Ohio:											
Cincinnati	7		7	0	11	16	0	9	0	10	142
Cleveland	4	152	4	0	14	114	0	11	0	18	206
Columbus	5	4	4	157	7	8	0	2	0	1	87
Toledo	1	3	3	107	5	31	0	6	1	5	81

[1] Exclusive of Oklahoma City and Tulsa.

City reports for week ended January 21, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Indiana:											
Fort Wayne	5	-	2	0	3	3	0	3	0	0	28
Indianapolis	1	-	1	11	15	11	0	2	0	25	-
South Bend	0	-	0	0	0	2	0	0	0	8	12
Terre Haute	2	-	0	0	1	7	0	1	0	0	18
Illinois:											
Chicago	9	17	11	148	57	258	0	32	1	26	700
Springfield	2	-	0	0	4	10	0	1	2	0	33
Michigan:											
Detroit	18	19	11	137	28	136	0	22	0	102	280
Flint	1	68	5	1	6	6	0	2	0	2	38
Grand Rapids	0	-	4	1	3	8	0	0	0	40	29
Wisconsin:											
Kenosha	0	1	1	0	0	5	3	1	0	3	9
Madison	2	-	-	11	-	1	0	-	0	2	-
Milwaukee	1	7	6	3	14	40	0	7	0	21	119
Racine	0	3	3	0	1	5	0	1	0	1	23
Superior	0	-	1	1	0	0	0	1	0	0	6
Minnesota:											
Duluth	0	-	1	1	3	0	0	0	0	23	21
Minneapolis	1	-	4	333	9	33	0	2	0	3	118
St. Paul	1	2	2	14	8	13	0	2	0	47	63
Iowa:											
Des Moines	6	-	-	0	-	3	3	-	1	0	38
Sioux City	1	-	-	0	-	1	0		0	1	-
Waterloo	1	-	-	0	-	1	0		0	1	-
Missouri:											
Kansas City	3	-	2	74	18	35	0	5	0	1	105
St. Joseph	4	-	2	0	11	4	0	0	0	0	48
St. Louis	17	4	1	5	7	20	0	11	0	2	239
North Dakota:											
Fargo	0	-	3	0	0	1	0	0	0	0	9
Grand Forks	0	-	0	3	0	0	0	0	0	0	-
South Dakota:											
Aberdeen	0	-	0	0	0	0	0	0	0	0	-
Nebraska:											
Omaha	5	-	0	3	18	8	1	1	0	0	71
Kansas:											
Topeka	1	-	1	10	12	0	0	0	0	0	31
Wichita	0	-	6	1	7	2	0	1	0	1	45
Delaware:											
Wilmington	0	-	0	0	4	5	0	0	0	0	29
Maryland:											
Baltimore	4	95	8	2	42	73	0	5	0	14	222
Cumberland	0	-	0	0	1	0	0	0	0	0	17
Frederick	0	-	0	0	0	0	0	0	0	0	-
District of Columbia:											
Washington	10	8	2	2	24	22	0	14	0	2	176
Virginia:											
Lynchburg	0	-	0	1	1	2	0	0	2	4	18
Norfolk	0	6	0	1	5	3	0	3	0	2	25
Richmond	1	-	3	1	8	5	0	3	0	9	67
Roanoke	1	-	3	33	2	2	0	0	0	0	19
West Virginia:											
Charleston	1	2	1	0	0	0	0	2	[1] 1	0	15
Huntington	2	-	0	21	0	2	0	0	0	0	-
Wheeling	0	-	1	212	2	1	0	0	0	4	16
North Carolina:											
Raleigh	0	2	0	0	1	2	0	1	0	0	7
Wilmington	0	-	0	18	1	0	1	1	1	2	21
Winston-Salem	0	15	0	0	3	1	0	0	0	6	11
South Carolina:											
Charleston	0	488	1	0	4	0	0	1	0	0	31
Columbia	1	-	1	0	16	1	0	4	0	1	106
Georgia:											
Atlanta	5	44	3	0	9	1	0	4	2	18	78
Brunswick	0	-	0	0	0	0	0	0	0	0	1
Savannah	2	38	4	0	2	3	0	0	0	0	34
Florida:											
Miami	0	2	3	0	1	0	0	3	1	1	21
Tampa	4	5	5	0	0	1	0	3	0	1	30

[1] Nonresident.

City reports for week ended January 21, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Kentucky:											
Ashland	1	20	0	1	0	2	0	0	0	1	
Lexington	0	7	0	2	5	1	0	3	0	0	19
Louisville	4	13	2	0	4	14	0	1	0	3	68
Tennessee:											
Memphis	1		8	0	5	4	0	4	0	1	75
Nashville	0		9	0	7	3	0	3	0	0	51
Alabama:											
Birmingham	1	16	3	0	4	4	0	5	0	7	68
Mobile	0		0	0	0	0	0	2	2	0	20
Montgomery	1	2		0		1	0		0	0	
Arkansas:											
Fort Smith	0		0	0	0	2	0	0	0	0	
Little Rock	2		0	1	2	1	0	1	0	0	5
Louisiana:											
New Orleans	10	8	4	2	11	5	0	9	1	13	171
Shreveport	0		0	0	2	1	0	1	0	0	25
Oklahoma:											
Muskogee	0	6		0		2	0		0	0	
Tulsa	0			0		0	0		0	2	
Texas:											
Dallas	13	7	7	7	7	6	1	3	0	1	73
Fort Worth	7		4	8	6	5	2	1	1	0	40
Galveston	2		0	1	6	4	0	0	2	0	17
Houston	10		3	21	10	3	0	3	1	0	75
San Antonio	5		7	1	4	0	0	1	0	0	60
Montana:											
Billings	0		0	0	0	0	0	0	0	0	9
Great Falls	0		2	37	2	0	0	1	0	1	12
Helena	0	47	0	0	0	0	0	0	0	0	6
Missoula	0	50	0	0	1	2	0	0	0	0	4
Idaho:											
Boise	0		0	5	2	0	4	0	0	0	9
Colorado:											
Denver	3	76	7	3	11	15	0	7	0	0	80
Pueblo	0		3	0	3	0	0	0	0	1	13
New Mexico:											
Albuquerque	1		0	0	1	4	0	6	0	0	19
Arizona:											
Phoenix	1		3	1	0	3	0	4	0	0	34
Utah:											
Salt Lake City	0		1	0	2	5	0	2	0	0	46
Nevada:											
Reno	0		0	0	0	0	0	1	0	0	6
Washington:											
Seattle	0	2		1		4	0		0	3	
Spokane	0			0		1	0		0	0	
Tacoma	0		0	0	2	5	1	0	0	0	21
Oregon:											
Portland	1	7	0	1	5	4	8	2	0	0	87
Salem	0	11		4		1	0		0	0	
California:											
Los Angeles	25	122	13	82	30	56	32	21	0	25	365
Sacramento	1	1	1	0	2	3	0	9	0	3	38
San Francisco	2	133	8	3	14	6	0	10	0	56	187

City reports for week ended January 21, 1933—Continued

State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths	
Massachusetts:			
Boston	1	0	0
Springfield	1	1	0
New York:			
New York	6	3	0
Ohio:			
Cincinnati	1	1	0
Indiana:			
Indianapolis	1	2	0
Illinois:			
Chicago	13	6	0
Michigan:			
Flint	1	0	0
Minnesota:			
Duluth	0	1	0
Minneapolis	0	1	0
Iowa:			
Sioux City	1	0	0
Missouri:			
St. Joseph	2	1	0
St. Louis	1	1	1
Maryland:			
Baltimore	1	0	0
Virginia:			
Norfolk	0	0	1
North Carolina:			
Wilmington	1	1	0
Tennessee:			
Memphis	0	1	0
Nashville	2	0	0
Louisiana:			
New Orleans	1	0	0
New Mexico:			
Albuquerque	0	1	0
Washington:			
Seattle	1	0	0
Oregon:			
Portland	1	0	0
California:			
Los Angeles	0	1	1

Lethargic encephalitis.—Cases: Philadelphia, 1; Pittsburgh, 1; Columbus, 1; Detroit, 2.
Dengue.—Cases: Charleston, S. C., 4.
Pellagra.—Cases: Winston-Salem, 1; Charleston, S. C., 4, Savannah, 1; New Orleans, 1; San Francisco, 1.
Typhus fever.—Cases: Baltimore, 1; Montgomery, 1; Los Angeles, 1.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Week ended January 14, 1933.—The Department of Pensions and National Health of Canada reports cases of certain communicable diseases for the week ended January 14, 1933, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		2		1	1					4
Chicken pox	4	42	1	227	434	34	20		27	789
Diphtheria		3	2	26	17	7	2	1		58
Erysipelas				5	3				1	9
Influenza	1	88		23	610	57	253		307	1,339
Lethargic encephalitis				1	1					2
Measles		26	11	75	705	2		11	14	844
Mumps		2			246	18	1	1	20	288
Paratyphoid fever									1	1
Pneumonia		18			24		1		10	53
Poliomyelitis				4						4
Scarlet fever		5	13	56	79	13	12	1	11	190
Smallpox					1		7			8
Tuberculosis			10	60	43	7		1	18	139
Typhoid fever			2	15	8	2		1		28
Undulant fever					2					2
Whooping cough				142	147	36	4	4	26	359

Ontario Province—Communicable diseases—Five weeks ended December 31, 1932.—The Department of Health of the Province of Ontario, Canada, reports certain communicable diseases for the five weeks ended December 31, 1932, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Actinomycosis	1		Paratyphoid fever	1	
Cerebrospinal meningitis	1	1	Pneumonia		196
Chicken pox	1,506		Poliomyelitis	1	1
Diphtheria	81	4	Scarlet fever	362	2
Erysipelas	3		Septic sore throat	1	1
German measles	25		Smallpox	13	
Gonorrhea	302		Syphilis	140	
Influenza	1,284	22	Trench mouth	5	
Jaundice	1		Tuberculosis	225	54
Leprosy	1		Typhoid fever	12	2
Lethargic encephalitis	2	1	Undulant fever	6	
Measles	2,334	9	Whooping cough	374	
Mumps	563				

CZECHOSLOVAKIA

Communicable diseases—November, 1932.—During the month of November, 1932, certain communicable diseases were reported in Czechoslovakia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	8	1	Puerperal fever	65	20
Cerebrospinal meningitis	6	2	Scarlet fever	3,265	30
Diphtheria	5,465	246	Trachoma	126	
Dysentery	463	66	Typhoid fever	1,273	103
Malaria	11		Typhus fever	2	
Paratyphoid fever	19	1			

DENMARK

Influenza—Copenhagen.—Cases of influenza have been reported in Copenhagen, Denmark, as follows: Week ended December 24, 1932, 168; week ended December 31, 1932, 268; week ended January 7, 1933, 550; week ended January 14, 1933, 1,933 cases.

GREAT BRITAIN

Influenza.—Deaths from influenza were registered in the 118 great towns of England and Wales and the 16 principal towns of Scotland as follows:

Week ended—	118 great towns, England and Wales	16 principal towns, Scotland	Week ended—	118 great towns, England and Wales	16 principal towns, Scotland
December 17, 1932	85	32	January 7, 1933	681	88
December 24, 1932	120	112	January 14, 1933	1,041	111
December 31, 1932	303	120	January 21, 1933		108

The following table shows the death rates per 1,000 population in towns of Great Britain during the five weeks ended January 14, 1933, compared with the death rates for the week ended January 16 last year.

Deaths (all causes) per 1,000 population, annual basis

	Week ended—					
	Dec. 17, 1932	Dec. 24, 1932	Dec. 31, 1932	Jan. 7, 1933	Jan. 14, 1933	Jan. 16, 1932
118 great towns of England and Wales	13.2	13.1	14.1	16.4	18.7	16.1
Greater London	12.6	11.5	12.2	14.4	17.0	16.7
Great towns in southeastern area	13.2	12.1	12.9	15.4	18.1	17.0
Great towns in northern area	13.5	14.1	14.9	17.4	19.9	15.7
Great towns in midland area	12.4	13.2	16.2	18.5	19.1	14.9
Great towns in eastern area	10.7	11.0	12.6	12.7	15.1	14.6
Great towns in southwestern area	16.0	14.9	13.1	11.9	15.5	16.3
Great towns in Wales and Monmouthshire	14.2	15.2	12.2	12.6	15.3	16.4
Liverpool	15.3	15.2	16.9	21.2	22.7	13.7
Bristol	11.0	11.4	10.4	11.0	17.1	12.7
Sixteen principal towns of Scotland	16.7	21.1	20.7	19.5	19.9	15.4
Glasgow	19.8	28.4	27.0	19.3	18.2	15.8

YUGOSLAVIA

Communicable diseases—December, 1932.—During the month of December, 1932, certain communicable diseases were reported in Yugoslavia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	51	11	Poliomyelitis	14	1
Cerebrospinal meningitis	6	1	Sepsis	9	4
Diphtheria and croup	1,564	187	Scarlet fever	379	17
Dysentery	58	13	Tetanus	14	10
Erysipelas	182	9	Typhoid fever	907	156
Measles	428	8	Typhus fever	15	2
Paratyphoid fever	42	3			

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

(NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the Public Health Reports for January 27, 1933, pp. 101–112. A similar cumulative table will appear in the Public Health Reports to be issued February 24, 1933, and thereafter, at least for the time being, in the issue published on the last Friday of each month.)

Cholera

Philippine Islands.—During the week ended January 28, 1933, 81 cases of cholera with 20 deaths were reported in the Province of Leyte, Philippine Islands.

Plague

Hawaii Territory.—A plague-infected rat was reported January 5, 1933, and another January 18, 1933, at Kukaiau, Hamakua District, island of Hawaii.

A plague-infected rat was reported January 16, 1933, at Omaopio, about 12 miles from Kahului, island of Maui.

Smallpox

China—Canton.—During the week ended January 21, 1933, 151 cases of smallpox were reported at Canton, China.

UNITED STATES TREASURY DEPARTMENT

PUBLIC HEALTH REPORTS

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UNITED STATES PUBLIC HEALTH SERVICE

HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst. Surg. Gen. R. C. WILLIAMS, *Chief of Division*

The PUBLIC HEALTH REPORTS are issued weekly by the United States Public Health Service through its Division of Sanitary Reports and Statistics, pursuant to acts of Congress approved February 15, 1893, and August 14, 1912.

They contain: (1) Current information of the prevalence and geographic distribution of preventable diseases in the United States in so far as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other communicable diseases throughout the world. (2) Articles relating to the cause, prevention, or control of disease. (3) Other pertinent information regarding sanitation and the conservation of public health.

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PUBLIC HEALTH REPORTS

VOL. 48 FEBRUARY 17, 1933 NO. 7

CURRENT PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES [1]

January 1-28, 1933

The prevalence of certain important communicable diseases, as indicated by weekly telegraphic reports from State health departments to the United States Public Health Service, is summarized in this report. The underlying statistical data are published weekly in Public Health Reports, under the section entitled "Prevalence of Disease."

Influenza.—During the current 4-week period 123,055 cases of influenza were reported in 37 [2] States as compared with 157,682 for the preceding four weeks and 6,882, 24,656, and 10,080 for the corresponding periods of 1932, 1931, and 1930, respectively. From a maximum of 54,694 cases reported during the first week of January and 53,120 during the last week of December, the number has declined to 10,273 for the week ended February 4, which is still approximately double the number reported for that week in 1932. The peak of reported cases was well passed in all sections, but the reports were still particularly high in the Northeast.

In the 85 cities included in the Census Bureau's Weekly Health Index the death rate from all causes reached a maximum of 14.7 per 1,000 (annual basis) for the last week of December, and has declined steadily to 12.1 for the week ended February 4, a lower figure than that for the corresponding week of 1930 or 1931, but higher than in 1932. Many of the New England cities still showed high death rates for the week ended February 4, but in other sections the peak was well passed.

Meningococcus meningitis.—The incidence of meningococcus meningitis increased about 50 per cent during the current 4-week period over the preceding four weeks. The number of cases (362) was about 15 per cent in excess of the number reported for the corresponding period last year, but was only about 60 per cent of the number

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[1] From the Office of Statistical Investigations, U. S. Public Health Service. The numbers of States included for the various diseases are as follows Typhoid fever, 47, poliomyelitis, 48, meningococcus meningitis, 48, smallpox, 48, measles, 45, diphtheria, 47, scarlet fever, 47, influenza, 38 States and New York City. The District of Columbia is counted as a State in these reports.

[2] The States included are those having continuous records for four years. Kansas is omitted because of the sudden and unusual increase in the number of cases reported immediately following a special letter from the State health officer to physicians asking their cooperation in obtaining complete reports.

reported in 1931 and 40 per cent of the number in 1930 for the same period. The disease seemed to be most prevalent in States in the North and South Central geographic areas. In Illinois 68 cases were reported for the current period, as against 35 for the same period last year, and in Iowa 19 cases as compared with 2 last year. In Texas 2 cases were reported for this period last year, and in Oklahoma no cases, whereas for the current period there were 8 and 12 cases reported in these States, respectively. The total number of cases from the South Central group of States was more than twice the number reported for the same period last year. The New England and Middle Atlantic States reported decreases, as did also the Mountain and Pacific areas

Smallpox.—Each geographic area reported an appreciable decrease in the incidence of smallpox as compared with the corresponding period in recent years. In the New England States, where the disease was unusually prevalent at this time last year, with 140 cases in the 4-week period, only 3 cases were reported this year. Other areas reported decreases ranging from 20 per cent in the Mountain area to 85 per cent in the Middle Atlantic. For the entire reporting area the number of cases totaled 642, as compared with 2,084, 4,276, and, 6,552 for the corresponding period in the years 1932, 1931, and 1930, respectively.

Scarlet fever.—The scarlet fever incidence was slightly higher during the current 4-week period than for the corresponding period last year, and more than 2,000 cases above the average for recent years was reported. For the combined reporting area the number of cases totaled 21,507. The disease seemed to be most prevalent in the East North Central States. Other groups closely approximated last year's incidence, and the South Central group reported a 33 per cent decrease in the number of cases from that reported for the same period last year.

Measles.—There were 21,656 cases of measles reported for the four weeks ended January 28, approximately 7,700 more than were reported for the preceding 4-week period. For the country as a whole the number of cases was only about 80 per cent of the number reported for the corresponding period last year and 70 per cent of the number in 1931. It closely approximated the figure (22,989 cases) for 1930. In relation to the incidence for the same period last year, the New England and Middle Atlantic, East South Central, and Pacific areas showed decreases, while the North Central, South Atlantic, West South Central, and Mountain States showed appreciable increases. In the West North Central States the number of cases reported for the current period was almost three times the number reported last year at this time.

Diphtheria.—The number of cases of diphtheria for the current period was 4,191, as compared with 6,730, 5,429, and 6,706 for the corresponding period in the years 1932, 1931, and 1930 respectively. For the country as a whole, as well as for each geographic area except the South Central areas, the incidence was the lowest for this period in the five years for which data are available. As much as a 50 per cent decrease from last year's figure was reported for some areas, while others reported a decline of only about 25 per cent.

Poliomyelitis.—The incidence of poliomyelitis continued to decline through the month of January. For the current four weeks 82 cases were reported. This number represented a decline of approximately 50 per cent from last year's figure for the same period and 60 per cent from the number of cases for the corresponding period in 1931. For this period in 1930 and 1929, more nearly normal years, there were 77 and 65 cases, respectively. Seven cases of poliomyelitis were reported from Arizona as against none last year, and this seemed to be responsible for the 25 per cent increase in the Mountain area. All other areas reported decreases

Typhoid fever.—Due in part to an outbreak of typhoid fever in Chamberlain, S. Dak, the incidence for the country as a whole showed an increase instead of the expected seasonal decrease. Only one other State, California, reported an appreciable increase over last year's figure. From South Dakota 251 cases were reported for the current period, as compared with 9 for the same period last year; and while the figure from California was not large (27), it was more than twice the number reported for this period last year. A comparison of geographic areas shows that exclusive of the incidence in those two States, the disease was considerably less prevalent in each area during the current period than in the corresponding period last year. In fact, in some sections the incidence was the lowest in recent years.

Deaths, all causes.—The average death rate in large cities, as reported by the Bureau of the Census, for the four weeks ended January 28 was 13.1. For the corresponding period in 1932, 1931, and 1930 the rate was 12.3, 14.5, and 13.0, respectively. For the week ended February 4 the rate was 12.1, as compared with 11.8, 14.3, and 13.7 for the corresponding period in the years 1932, 1931, and 1930, respectively.

RELATION BETWEEN TRYPANOCIDAL AND SPIROCHETICIDAL ACTIVITIES OF NEOARSPHENAMINE

III. Uniformity of Effect of Different Types of Neoarsphenamine on the Serological Reactions in Human Syphilis[1]

By MAURICE BUCHHOLTZ, *Acting Assistant Surgeon*, and T. F. PROBEY, *Assistant Pharmacologist, United States Public Health Service*

In earlier reports (1) and (2) it has been shown that certain specimens of neoarsphenamine varying greatly in trypanocidal activity gave substantially equal results in the treatment and in the prophylaxis of syphilis in rabbits. This disagreement in the results between the trypanocidal and spirocheticidal tests indicated the necessity of ascertaining the efficacy of these products in the treatment of syphilis in man.

A very interesting comparison of the therapeutic activity of neoarsphenamine as measured by the trypanocidal test in animals and the spirocheticidal efficacy in man was reported by Dale and White (3). In this report a parallelism was found to exist between the dose of neoarsphenamine necessary to free the human chancre of *Treponema pallidum* in 18 to 20 hours and the minimal effective dose in mice inoculated with *Trypanosoma equiperdum.*

The products used in the present investigation are the same as those used in the reports referred to above (1) (2). Neoarsphenamine brand E was the most effective in trypanocidal activity, and brand F proved to be the least efficient. While it would have been desirable for comparative purposes to use in the work here reported the same method employed by Dale and White, it was impossible, as the material, covering the several stages of the disease, did not lend itself to a technique adapted only for primary darkfield-positive cases.

All the cases of syphilis treated during a given period in the United States Marine Hospital at Stapleton, N. Y., were divided into two groups of equal size for treatment, one group receiving the product E and the other product F. In this manner the therapeutic efficacy of two types of neoarsphenamine in the treatment of the various stages of syphilis in man could be comparatively studied. The effect of the treatment was judged by the quantitative Kahn precipitation test before, during, and after the course of treatment. The appraisal of the efficiency of the treatment is based upon the direction of the modification of the quantitative serum reaction, which is recorded as reduced, unaffected, or increased. All cases reporting two or more serological tests, regardless of the treatment received, are included, and the cases with only one serological test or with negative report in all tests are excluded.

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[1] From the United States Marine Hospital, Stapleton, N. Y., and the National Institute of Health, Washington, D. C. Submitted for publication July 6, 1932.

The few cases which received more than two courses of treatment were generally unsatisfactory for consideration in the comparative study of the effect of treatment, as they represented mostly latent and tertiary syphilis with doubtful quantitative serum tests, and with considerable previous treatment. This report does not consider the permanent effect but only the immediate effect of the treatment as indicated by the comparison of the serum tests.

A complete physical examination was made preliminary to administering arsenical treatment. The patient was questioned concerning any reactions following the last treatment, with special reference to any toxic skin eruptions.

Each dose of 0.9 gram of drug was dissolved in 100 c c sterile distilled water. The first injection for each patient consisted of 0.6 gram, and thereafter every injection consisted of 0.9 gram throughout the entire course. All injections were given by the intravenous gravity method.

The course of treatment consisted of eight injections of neoarsphenamine and eight injections of mercury at weekly intervals. What influence the mercury might have had on the reacting substances in the serum we are not prepared to say.

The result of the comparison is indicated in Table 1.

TABLE 1. *Effect on reacting substances in quantitative Kahn tests of neoarsphenamine E (of high trypanocidal activity) and F (of low trypanocidal activity)*

[illegible]	Com-pared	Effect in serum tests: Reduced	No effect	Increased
E NEOARSPHENAMINE	[1] 54	[2] 44	[3] 2	[4] 8
1 course	47	39	1	7
Primary syphilis	6	5	0	1
Secondary syphilis	14	14	0	0
Latent syphilis	19	15	1	3
Tertiary syphilis	8	5	0	3
2 courses	7	5	1	1
Primary syphilis	2	2	0	0
Secondary syphilis	1	1	0	0
Latent syphilis	2	2	0	0
Tertiary syphilis	2	0	1	1
F NEOARSPHENAMINE	[1] 56	[5] 45	[6] 7	[7] 4
1 course	43	33	7	3
Primary syphilis	7	6	1	0
Secondary syphilis	13	11	1	1
Latent syphilis	13	10	2	1
Tertiary syphilis	10	6	3	1
2 courses	13	12	0	1
Primary syphilis	2	2	0	0
Secondary syphilis	5	5	0	0
Latent syphilis	3	3	0	0
Tertiary syphilis	3	2	0	1

[1] 100 per cent.
[2] 81.5 per cent.
[3] 3.7 per cent.
[4] 14.8 per cent.
[5] 80.4 per cent.
[6] 12.5 per cent.
[7] 7.1 per cent.

After the exclusion of unsuitable cases, as above specified, 54 cases remained in the E group, and 56 in the F group. These are classified in the table according as to whether they received one or two courses of treatment, and according to the type of syphilis which they represented, whether primary, secondary, latent, or tertiary. The results on the reacting substance in the serum are indicated for each subdivision. It is seen that, in general, the different kinds of cases are divided fairly evenly, numerically, between the E group and the F group, and the results indicate no basis for choice in the products under investigation.

Favorable results are noted in 44 (81.5 per cent) of the group receiving neoarsphenamine E, no effect in 2 (3.7 per cent), and in 8 cases (14.8 per cent) the reacting substances in the serum increased. In 45 cases (80.4 per cent) of the F group the reacting substance in the serum is recorded as reduced, in 7 cases (12.5 per cent) as unaffected, and 4 cases (7.1 per cent) show an increase after the treatment.

In regard to the amount of increase or decrease, there is likewise no significant basis for choice between the two neoarsphenamines. Of the cases showing reduction of reacting substance, those in the E group had an aggregate reduction in Kahn units from 11,160 to 2,112, or a reduction of 81 per cent, and those in the F group had a reduction of 83 per cent, from 9,184 to 1,552. The aggregate unitage of the cases unaffected by the treatment was 264 for the E group and 84 for the F group. The cases in the E group with increased Kahn reaction after treatment changed in aggregate unitage from 2,424 to 4,700, and those in the F group from 3,120 to 4,880. Thus the total unitage in the E group decreased from 13,848 to 7,076, or 49 per cent, while the total unitage in the F group decreased 47 per cent, from 12,388 to 6,516.

REACTIONS

Unfavorable reactions occurred after the administration of the neoarsphenamines in 14 cases of the total of 156 cases treated; the 156 cases were divided equally between the E group and the F group. This represented one reaction in every 11.1 cases treated, or 1 reaction to every 76 treatments, the approximate number of injections being 1,063.

The frequency of reactions after the product E was 1 in every 13 cases, 6 in 78 cases; after product F, 1 in every 9.8 cases, 8 in 78 cases. The 6 reactions after product E comprised 2 vasomotor reactions and 2 cases each of jaundice and of dermatitis. The 8 reactions after product F comprised 1 Herxheimer, 1 unclassified, 3 vasomotor reactions, and 3 cases of dermatitis.

The cases reporting reactions of most interest were one severe exfoliative dermatitis after the seventh treatment in the first series of

product F. and two cases of jaundice occurring in the third course of treatment of the product E.

CONCLUSION

From the limited data presented, it is indicated that two neoarsphenamines, previously reported as varying in their trypanocidal activity, but presenting no noteworthy difference in the spirocheticidal activity in syphilis in rabbits, when used in the routine treatment of syphilis, together with mercury, have shown no significant difference in their ability to influence the reacting substances in sera from cases of syphilis in man.

REFERENCES

(1) Probey and McCoy: Pub. Health Rep., vol. 45, 1930, p. 1716.
(2) Probey, T. F.: Pub. Health Rep., vol. 47, 1932, p. 429.
(3) Dale and White: Lancet, vol. 202, 1922, p. 779.

COURT DECISION RELATING TO PUBLIC HEALTH

Statute relative to unlawful possession of narcotics construed.—(California District Court of Appeal, First District, Division 1; People v. Belli, 15 P. (2d) 809; decided Nov. 1, 1932.) In a prosecution for illegally possessing morphine, the evidence for the State was to the effect that, just prior to his arrest, the defendant dropped a package containing morphine on the sidewalk and that such package was immediately picked up by another person. The defendant contended that such evidence was legally insufficient to establish possession on his part within the meaning of the State narcotic law (Laws 1927, ch. 60, sec. 1) because it affirmatively showed that no narcotics were found in his possession but that they were taken from the other person. In holding that the evidence was sufficient to establish possession within the meaning of the narcotic law, the district court of appeal said:

* * * As held in People v. Herbert, 59 Cal. App. 158, 210 P. 276, in order to establish possession within the meaning of said act [narcotic law], it is necessary to prove that the possession was immediate and exclusive and under the dominion and control of the person charged with such possession. But nowhere do the terms of the act require, nor, so far as our attention has been called, do any of the decisions interpreting the act hold, as appellant seems to contend, that proof of possession at the very time of arrest is essential. Here, as shown, it appears from the evidence adduced in support of the prosecution's case that, immediately preceding his arrest, appellant had the narcotics in his immediate and exclusive possession and under his dominion and control and that, upon divesting himself thereof, the same were picked up immediately by Wilson, which, in our opinion, is legally sufficient to establish possession on the part of appellant within the meaning of said act.

FINAL SUMMARY OF MORTALITY STATISTICS, 1931

A provisional summary of mortality statistics for the registration area of the United States for 1931 was published in the Public Health Reports for February 3, 1933, pages 125-127. The final figures have just been issued by the Bureau of the Census and are printed in the following table:

Mortality Statistics, 1931

Cause of death	Deaths and death rates in the United States registration area, 1931-1930			
	Number		Rate per 100,000 estimated population	
	1931	1930	1931	1930
Total deaths (all causes)[1]	1,322,587	1,343,356	1,107.5	1,133.1
Typhoid and paratyphoid fever	5,382	5,698	4.5	4.8
Smallpox	95	165	.1	.1
Measles	3,576	3,820	3.0	3.2
Scarlet fever	2,650	2,279	2.2	1.9
Whooping cough	4,619	5,707	3.9	4.8
Diphtheria	5,738	5,822	4.8	4.9
Influenza	31,701	23,066	26.5	19.5
Dysentery	2,441	3,356	2.0	2.8
Erysipelas	2,275	2,508	1.9	2.1
Acute poliomyelitis and acute polioencephalitis	2,096	1,370	1.8	1.2
Lethargic or epidemic encephalitis	972	1,062	.8	.9
Epidemic cerebrospinal meningitis	2,832	4,211	2.4	3.6
Tuberculosis (all forms)	81,395	84,741	68.2	71.5
Of the respiratory system	72,515	75,120	60.7	63.4
Of the meninges, central nervous system	2,709	2,995	2.3	2.5
Other forms	6,171	6,626	5.2	5.6
Syphilis[2]	16,454	16,670	13.8	14.1
Malaria	2,536	3,403	2.1	2.9
Cancer and other malignant tumors	118,141	115,265	98.9	97.2
Of the buccal cavity	3,563	3,543	3.0	3.0
Of the pharynx	1,004	1,011	.8	.9
Of the esophagus	2,038	1,896	1.7	1.6
Of the stomach and duodenum	25,397	25,408	21.3	21.4
Of the liver and biliary passages	10,290	10,388	8.6	8.8
Of the pancreas	3,139	2,969	2.6	2.5
Of other digestive tract and peritoneum	17,919	17,151	15.0	14.5
Of the respiratory system	4,039	3,818	3.4	3.2
Of the uterus	14,464	14,132	12.1	11.9
Of other female genital organs	2,565	2,200	2.1	1.9
Of the breast	11,444	10,912	9.6	9.2
Of the male genito-urinary organs	9,184	8,661	7.7	7.3
Of the skin	2,988	3,019	2.5	2.5
Of other or unspecified organs	10,109	10,037	8.5	8.5
Rheumatism and gout	4,133	4,493	3.5	3.8
Diabetes mellitus	24,331	22,528	20.4	19.0
Pellagra	5,091	6,333	4.3	5.3
Pernicious anemia	3,734	3,908	3.1	3.3
Alcoholism (acute or chronic)	3,933	4,158	3.3	3.5
Meningitis (nonepidemic)	2,782	3,048	2.3	2.6
Cerebral hemorrhage, embolism, thrombosis, and softening	99,376	100,646	83.2	84.9
Hemiplegia, other paralysis, cause not specified	4,035	4,671	3.4	3.9
Diseases of the heart	253,985	253,084	212.7	213.5
Acute endocarditis	3,686	3,913	3.1	3.3
Chronic endocarditis, valvular diseases	62,473	66,482	52.3	56.1
Diseases of myocardium	117,904	115,864	98.7	97.7
Other diseases of the heart	69,922	66,825	58.6	56.4
Arteriosclerosis (coronary arteries excepted)	21,027	21,868	17.6	18.4
Other diseases of the circulatory system	6,213	6,335	5.2	5.3
Bronchitis	4,586	4,992	3.8	4.2
Pneumonia (all forms)	96,974	98,657	81.2	83.2
Respiratory diseases other than bronchitis and pneumonia (all forms)	9,415	9,588	7.9	8.1
Ulcer of the stomach and duodenum	7,259	7,360	6.1	6.2

[1] Exclusive of stillbirths.
[2] Includes tabes dorsalis (locomotor ataxia) and general paralysis of the insane.

Mortality Statistics, 1931—Continued

Cause of death	Deaths and death rates in the United States registration area, 1931–1930			
	Number		Rate per 100,000 estimated population	
	1931	1930	1931	1930
Diarrhea and enteritis	24,723	31,192	20.7	26.3
Diarrhea and enteritis (under 2 years)	18,704	23,294	15.7	19.6
Diarrhea and enteritis (2 years and over)	6,019	7,898	5.0	6.7
Appendicitis	18,113	18,100	15.2	15.3
Hernia, intestinal obstruction	12,539	12,176	10.5	10.3
Cirrhosis of the liver	8,851	8,583	7.4	7.2
Nephritis	104,119	107,619	87.2	90.8
Puerperal septicemia	5,415	5,439	4.6	4.6
Puerperal causes other than puerperal septicemia	8,794	9,726	7.4	8.2
Congenital malformations and diseases of early infancy	67,426	72,216	56.5	60.9
Suicide	20,088	18,551	16.8	15.6
Homicide	11,160	10,617	9.3	9.0
Accidental and unspecified external causes	93,811	95,527	78.6	80.6
Burns (conflagrations excepted)[1]	5,893	6,523	4.9	5.5
Accidental drowning[1]	7,515	7,450	6.3	6.3
Accidental shooting	3,041	3,120	2.5	2.6
Accidental falls[1]	20,356	20,030	17.0	16.9
Crushing[1]	6,749	6,511	5.7	5.5
Excessive heat (burns excepted)	2,768	1,487	2.3	1.3
Other external causes	47,459	50,376	39.7	42.5
All other defined causes	95,191	97,898	79.7	82.6
Unknown or ill-defined causes	22,517	24,864	18.9	21.0
SUPPLEMENTAL				
Mine and quarry accidents	1,849	2,560	1.5	2.2
Machinery accidents	1,630	2,065	1.4	1.7
Railroad accidents	5,243	5,773	4.4	4.9
Collision with automobile	1,651	1,760	1.4	1.5
Other railroad accidents	3,592	4,012	3.0	3.4
Street-car accidents	1,094	1,174	.9	1.0
Collision with automobile	419	463	.4	.4
Other street-car accidents	675	711	.6	.6
Automobile accidents (excluding collision with railroad trains and street cars)	30,042	29,080	25.2	24.5
Other transportation accidents[4]	2,801	2,764	2.3	2.3

[3] Includes deaths from this cause where the accident occurred in a mine or quarry, by machinery, or in connection with transportation.
[4] Include air, motor cycle, and water transportation accidents.

DEATHS DURING WEEK ENDED JANUARY 28, 1933

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Jan. 28, 1933	Corresponding week, 1932
Data from 85 large cities of the United States:		
Total deaths	8,860	8,075
Deaths per 1,000 population, annual basis	12.4	11.5
Deaths under 1 year of age	661	596
Deaths under 1 year of age per 1,000 estimated live births [1]	57	49
Deaths per 1,000 population, annual basis, first 4 weeks of year	13.1	12.0
Data from industrial insurance companies:		
Policies in force	69,080,905	74,193,592
Number of death claims	16,666	13,841
Death claims per 1,000 policies in force, annual rate	12.6	9.8
Death claims per 1,000 policies, first 4 weeks of year, annual rate	11.8	10.0

[1] 1933, 81 cities; 1932, 78 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks ended February 4, 1933, and February 6, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended February 4, 1933, and February 6, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Feb. 4, 1933	Week ended Feb. 6, 1932	Week ended Feb. 4, 1933	Week ended Feb. 6, 1932	Week ended Feb. 4, 1933	Week ended Feb. 6, 1932	Week ended Feb. 4, 1933	Week ended Feb. 6, 1932
New England States:								
Maine	2	6	1,025	77		581	1	0
New Hampshire	1	2			1	13	0	0
Vermont	6					100	0	0
Massachusetts	33	44	56	9	197	345	2	1
Rhode Island	5	9	19			1,054	0	0
Connecticut	11	3	210	6	157	128	1	1
Middle Atlantic States								
New York	55	145	[1] 81	[1] 102	1,815	1,363	11	12
New Jersey	22	48	278	14	641	113	1	5
Pennsylvania	98	122			1,099	1,441	3	4
East North Central States								
Ohio	62	71	44	11	528	202	0	2
Indiana	46	76	116	53	16	143	2	10
Illinois	48	124	67	80	179	151	14	8
Michigan	24	14	37	6	504	313	2	3
Wisconsin	3	35	754	44	244	133	3	2
West North Central States:								
Minnesota	8	7	6	1	754	6	2	0
Iowa	13	7				3	2	0
Missouri	34	40	30	5	282	26	4	4
North Dakota	4	3	699		55	7	0	0
South Dakota	1	5	8	9	3	76	0	1
Nebraska	9	5	276	127	17	24	1	5
Kansas	8	25	26	21	172	85	6	0
South Atlantic States:								
Delaware	3	2	13				0	0
Maryland [2]	11	34	328	28	6	14	1	3
District of Columbia	5	19	4	2	4		0	0
Virginia	20				106		3	
West Virginia	10	30	379	65	310	292	0	0
North Carolina [3]	36	32	406	29	316	179	3	1
South Carolina	17	17	2,286	443	74	36	1	1
Georgia [4]	18	8	571	171	2	7	1	0
Florida	7	19	55	5	5	9	0	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended February 4, 1933, and February 6, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Feb. 4, 1933	Week ended Feb. 6, 1932	Week ended Feb. 4, 1933	Week ended Feb. 6, 1932	Week ended Feb. 4, 1933	Week ended Feb. 6, 1932	Week ended Feb. 4, 1933	Week ended Feb. 6, 1932
East South Central States:								
Kentucky	23	53	60	209		68	4	3
Tennessee	13	31	277	159	18	29	0	2
Alabama	23	25	231	70	12	3	1	4
Mississippi	18	13					0	1
West South Central States:								
Arkansas	2	20	235	33	10	2	0	1
Louisiana	11	21	41	23	11	97	1	0
Oklahoma [4]	13	40	198	415		1	8	0
Texas [5]	100	71	597	76	558	15	2	0
Mountain States:								
Montana	5	2	576	1,959	187	94	0	0
Idaho	1	1	1		88		0	0
Wyoming			8	6	30		0	0
Colorado	2	13	76		7	40	0	1
New Mexico	13	5	52	76	3	12	0	0
Arizona			21	70	4		1	0
Utah [4]				125	1	1	0	3
Pacific States:								
Washington	11		1		9	514	1	2
Oregon	7	3	117	148	57	68	0	0
California	41	78	291	306	312	325	3	3
Total	912	1,120	10,880	5,013	8,791	8,113	85	83

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Feb. 4, 1933	Week ended Feb. 6, 1932	Week ended Feb. 4, 1933	Week ended Feb. 6, 1932	Week ended Feb. 4, 1933	Week ended Feb. 6, 1932	Week ended Feb. 4, 1933	Week ended Feb. 6, 1932
New England States:								
Maine	0	0	41	19	0	0	5	2
New Hampshire	0	0	25	14	0	0	0	1
Vermont	0	0	10	6	0	4	0	0
Massachusetts	0	3	328	523	0	3	3	3
Rhode Island	0	0	31	37	0	0	0	0
Connecticut	0	2	119	87	4	8	1	0
Middle Atlantic States:								
New York	2	5	1,052	1,071	0	5	10	15
New Jersey	1	4	304	204	0	0	3	4
Pennsylvania	0	1	1,038	658	0	0	6	22
East North Central States:								
Ohio	1	0	518	414	22	34	5	11
Indiana	1	2	122	151	2	33	7	3
Illinois	1	10	475	418	16	5	9	4
Michigan	1	0	443	366	3	2	3	4
Wisconsin	0	1	177	90	8	3	0	0
West North Central States:								
Minnesota	0	0	69	128	0	0	0	0
Iowa	0	0	34	55	24	28	1	3
Missouri	0	1	117	88	1	17	6	3
North Dakota	0	0	18	18	0	17	0	1
South Dakota	0	0	21	7	0	11	1	1
Nebraska	0	0	24	30	0	6	1	0
Kansas	2	0	61	52	1	2	4	2
South Atlantic States:								
Delaware	0	0	10	14	0	0	1	0
Maryland [3]	0	0	83	120	0	0	3	4
District of Columbia	0	0	13	23	0	1	1	0
Virginia	0	1	32		0		4	
West Virginia	1	0	39	47	0	4	4	14
North Carolina [3]	0	1	33	76	1	4	4	9
South Carolina	0	0	4	9	0	0	0	8
Georgia [3]	0	2	14	7	0	0	5	15
Florida	0	0	5	2	0	0	2	7

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended February 4, 1933, and February 6, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Feb. 4, 1933	Week ended Feb. 6, 1932	Week ended Feb. 4, 1933	Week ended Feb. 6, 1932	Week ended Feb. 4, 1933	Week ended Feb. 6, 1932	Week ended Feb. 4, 1933	Week ended Feb. 6, 1932
East South Central States								
Kentucky	0		48	59	0	16	5	11
Tennessee	0	0	21	16	3	6	10	6
Alabama	0	1	27	20	2	2	4	17
Mississippi	0	0	13	1[illegible]	0	17	3	10
West South Central States								
Arkansas	1	0	13	14	7	29	1	5
Louisiana	0	0	8	[illegible]3	0	5	3	9
Oklahoma [4]	0	0	26	11	8	29	0	9
Texas [3]	0	0	2	80	28	28	4	11
Mountain States								
Montana	0	0	[illegible]6	[illegible]2	1	1	1	1
Idaho	0	0	6	2	18	4	0	0
Wyoming	0	0	[illegible]	3	0	0	0	0
Colorado	0	0	46	[illegible]8	0	3	1	1
New Mexico	0	0	9	16	0	0	1	11
Arizona	0	0	4	1	0	0	0	0
Utah [2]	0	0	15	1	0	0	0	0
Pacific States								
Washington	0	0	44	[illegible]0	4	16	1	2
Oregon	0	0	15	20	1	5	2	2
California	1	3	237	143	34	7	12	[illegible]
Total	12	40	5,[illegible]29	5,456	191	3[illegible]5	137	234

[1] New York City only.
[2] Week ended Friday.
[3] Typhus fever, week ended Feb. 4, 1933, 1[illegible] cases, [illegible] in North Carolina, 8 cases in Georgia, 1 case in Alabama, and 5 cases in Texas.
[4] Figures for 1933 are exclusive of Oklahoma City and Tulsa.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
November, 1932										
Hawaii Territory	1	19	[illegible]				1		0	[illegible]
December, 1932										
California	18	233	5,440	1	233	3	8	522	29	37
Delaware		15	19		5		0	48	0	3
District of Columbia	5	28	207		8		0	60	0	0
Kansas	7	96	99,056		60		5	352	5	7
Mississippi	8	54	30,196	1,049	283	176	1	75	2	6
Missouri	16	247	1,307	3	116		0	478	1	14
Nevada		9	103				0	10	0	2
Puerto Rico		48	230	7,579	221	2	0		0	15
South Carolina		162	[illegible] 450	660	129	107	4	51	5	15
Texas	3	632	6,781	214		1	2	490		39
Washington	5	25	1,202		14		6	132	43	14

November 1932

	Cases
Hawaii Territory	
Chicken pox	1
Conjunctivitis, follicular	71
Filariasis	1
Hookworm disease	4
Leprosy	
Mumps	[illegible]
Tetanus	[illegible]
Trachoma	13[illegible]
Whooping cough	12

December 1932

	Cases
Botulism	
California	
Chickenpox	
California	1,1[illegible]
Delaware	26
District of Columbia	101
Kansas	[illegible]0
Mississippi	[illegible]31
Missouri	[illegible]38
Nevada	28
Puerto Rico	11
South Carolina	161
Washington	128
Diarrhea	
South Carolina	438
Dysentery	
California (amoebic)	11
California (bacillary)	23
Mississippi (amoebic)	21
Missouri	[illegible]
Puerto Rico	1,9[illegible]2
Washington	1
Filariasis	
Puerto Rico	4
Food poisoning	
California	78
German measles	
California	25
Kansas	2
Washington	9
Hookworm disease	Cases
Mississippi	12[illegible]
South Carolina	100
Impetigo contagiosa	
Kansas	1
Washington	1
Leprosy	
Puerto Rico	2
Washington	1
Lethargic encephalitis	
California	6
District of Columbia	1
South Carolina	6
Washington	1
Mumps	
California	13
Delaware	10
Kansas	300
Mississippi	105
Missouri	118
Puerto Rico	15
South Carolina	58
Washington	11
Ophthalmia neonatorum	
California	[illegible]
Delaware	4
Mississippi	8
Puerto Rico	16
South Carolina	2[illegible]
Paratyphoid fever	
California	1
South Carolina	3
Texas	9
Washington	1
Puerperal septicemia	
Mississippi	15
Puerto Rico	15
Washington	2
Rabies in animals	
California	65
Delaware	1
Mississippi	4
Missouri	11
South Carolina	7
Washington	3
Scabies	Cases
Kansas	6
Septic sore throat	
California	9
Kansas	6
Missouri	8
South Carolina	2
Tetanus	
California	3
Kansas	1
Puerto Rico	15
Tetanus, infantile	
Puerto Rico	20
Trachoma	
California	4
Kansas	1
Mississippi	2
Puerto Rico	1
Trichinosis	
California	1
Tularaemia	
Kansas	7
Missouri	49
South Carolina	1
Typhus fever	
South Carolina	1
Undulant fever	
California	10
Kansas	1
Missouri	8
Washington	2
Vincent's angina	
Kansas	3
South Carolina	1
Whooping cough	
California	758
Delaware	27
District of Columbia	28
Kansas	64
Mississippi	387
Missouri	58
Nevada	1
Puerto Rico	67
South Carolina	172
Washington	58

WEEKLY REPORTS FROM CITIES

City reports for week ended January 28, 1933

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Maine											
Portland	0	12	3	0	8	0	0	1	0	15	35
New Hampshire											
Concord	0		2	0	4	0	0	0	0	0	14
Nashua	0		0	0	0	0	0	0	0	0	--
Vermont											
Barre	0		0	0	0	0	0	0	0	0	1
Burlington	1		0	0	0	1	0	0	0	0	6
Massachusetts											
Boston	8	18	7	32	66	102	0	12	2	62	273
Fall River	1	1	2	0	12	6	0	1	0	4	44
Springfield	0		1	4	4	9	0	1	0	12	59
Worcester	3		0	7	5	20	0	3	2	14	53
Rhode Island											
Pawtucket	0		0	0	0	0	0	0	0	0	23
Providence	3	12	6	0	12	19	0	1	0	22	63
Connecticut											
Bridgeport	0	24	0	13	6	4	0	1	0	1	40
Hartford	0	4	2	6	10	2	0	1	0	4	51
New Haven	0	8	3	0	11	8	0	2	0	14	66
New York											
Buffalo	3		1	8	19	47	0	8	0	33	132
New York	61	138	45	595	250	274	0	108	2	124	1,659
Rochester	1	42	1	1	18	22	0	1	0	7	98
Syracuse	0	30	4	2	8	27	0	5	0	6	50
New Jersey											
Camden	5	5	3	1	2	10	0	0	0	0	32
Newark	3	70	0	130	12	31	0	2	0	16	114
Trenton	0	17	2	0	11	16	0	3	0	17	47

City reports for week ended January 28, 1933—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Pennsylvania:											
Philadelphia	6	78	13	46	60	153	0	35	4	5	526
Pittsburgh	5	9	4	0	18	36	0	7	0	25	113
Reading	1	-----	0	29	7	8	0	0	0	4	30
Ohio:											
Cincinnati	7	-	6	0	1	20	0	7	0	9	154
Cleveland	6	122	2	3	16	124	0	8	0	21	179
Columbus	3	2	2	102	6	11	0	0	0	0	73
Toledo	2	1	1	58	4	23	0	5	0	4	60
Indiana:											
Fort Wayne	8	-----	0	0	1	1	0	1	0	0	28
Indianapolis	12	-----	2	5	8	5	0	5	0	13	-----
South Bend	0	-----	1	0	1	5	0	0	0	6	13
Terre Haute	0	-----	0	0	0	6	0	0	0	0	15
Illinois:											
Chicago	2	20	12	123	63	282	0	33	1	24	732
Springfield	1	-----	0	0	3	9	0	0	0	3	19
Michigan:											
Detroit	15	6	4	152	28	141	0	24	2	116	252
Flint	0	38	1	2	2	4	0	0	0	0	24
Grand Rapids	0		1	0	1	11	0	0	0	54	36
Wisconsin:											
Kenosha	0	-----	0	0	0	5	1	0	0	6	2
Madison	0	-		2	-----	1	0	-	0	2	
Milwaukee	2	7	3	1	6	39	0	8	1	45	103
Racine	0	2	2	1	1	9	0	0	0	9	14
Superior	0		0	0	1	1	0	0	0	0	4
Minnesota:											
Duluth	0	-----	1	0	1	3	0	0	0	23	19
Minneapolis	3	-----	4	479	8	24	0	2	0	10	102
St. Paul	0	1	1	5	4	16	0	1	0	37	53
Iowa:											
Des Moines	2	-----	-----	0	-----	2	3	-----	0	0	34
Sioux City	1	-----	-----	0	-----	1	0	-----	0	3	-----
Waterloo	0	-----	-----	0	-----	2	0	-----	1	0	-
Missouri:											
Kansas City	2	-----	7	134	33	37	0	4	0	3	137
St. Joseph	3	-----	0	1	5	2	0	1	0	6	21
St. Louis	25	1	0	7	5	18	0	13	0	1	225
North Dakota:											
Fargo	0	-----	0	1	0	0	0	0	0	0	2
Grand Forks	0	-----	0	1	0	0	0	0	0	0	--
Nebraska:											
Omaha	3		0	3	8	16	1	1	0	0	60
Kansas:											
Topeka	0	-----	1	9	3	0	0	0	0	0	8
Wichita	4	--	2	0	5	3	0	2	0	6	25
Delaware:											
Wilmington	0	---	0	0	7	4	0	0	1	0	29
Maryland:											
Baltimore	5	43	7	0	29	50	0	9	0	15	205
Cumberland	0	1	0	1	2	2	0	0	0	0	9
Frederick	0	1	1	0	0	1	0	0	0	0	5
District of Col.:											
Washington	5	5	0	2	10	23	0	12	0	4	157
Virginia:											
Lynchburg	0	-----	0	2	3	1	0	0	1	4	11
Norfolk	0	3	0	0	3	5	0	1	0	2	-----
Richmond	1	-----	0	0	3	0	0	3	0	0	44
Roanoke	1	-----	2	37	1	1	0	3	0	0	15
West Virginia:											
Charleston	1	2	1	1	0	0	0	1	0	0	13
Huntington	1	-----	0	21	0	1	0	0	0	0	-----
Wheeling	0	-----	1	157	0	6	0	1	0	15	19
North Carolina:											
Raleigh	0	-----	0	0	1	2	0	0	0	0	15
Wilmington	0	3	0	10	2	1	0	1	0	1	10
Winston-Salem	0	3	1	2	1	1	0	1	0	0	13
South Carolina:											
Charleston	0	383	2	0	5	0	0	0	0	0	27
Columbia	0	-----	0	0	1	0	0	0	0	0	11
Georgia:											
Atlanta	0	33	2	0	7	3	0	1	0	13	78
Brunswick	0	1	1	1	0	0	0	0	0	0	4
Savannah	0	84	1	0	0	0	0	4	1	0	31

City reports for week ended January 28, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Florida:											
Miami	[illegible]	20	2	0	3	0	0	2	0	1	26
St. Petersburg								-		-----	-----
Tampa	2	5	5	0	0	1	0	2	0	4	23
Kentucky:											
Ashland	[illegible]		0	1	0	1	0	0	0	0	-----
Lexington	0		0	1	4	2	0	2	0	0	24
Louisville	11	3	0	0	18	9	0	2	0	0	85
Tennessee:											
Memphis	5		7	2	7	9	1	5	0	8	102
Nashville	1		2	2	5	5	0	1	0	1	44
Alabama:											
Birmingham	1	11	0	0	6	4	0	1	0	7	51
Mobile	2		0	0	0	1	0	2	0	0	13
Montgomery	0	5	-	0	-	0	0	---	0	0	-----
Arkansas:											
Fort Smith	1			0		1	0		0	0	-----
Little Rock	2		1	0	4	1	0	1	0	0	-----
Louisiana:											
New Orleans	4	8	6	0	16	5	0	12	0	1	145
Shreveport	0		2	0	6	0	0	4	0	0	43
Oklahoma:											
Muskogee	0		0	0	0	0	0	0	0	0	-----
Tulsa	0		0	0	0	3	0	0	0	5	-----
Texas:											
Dallas	7	3	3	7	7	7	0	0	1	9	46
Fort Worth	3		0	15	5	2	1	3	0	0	34
Galveston	2		0	2	2	0	0	1	0	0	14
Houston	6		4	20	9	3	0	3	0	6	82
San Antonio	5		6	2	3	0	0	4	0	0	69
Montana:											
Billings	0		0	2	0	0	0	0	0	0	6
Great Falls	0		0	11	2	0	0	0	0	0	10
Helena	0	30	0	0	0	0	0	0	0	0	2
Missoula	0		0	1	0	0	0	1	0	0	4
Idaho:											
Boise	0		0	15	3	2	3	1	0	0	9
Colorado:											
Denver	1	57	2	2	12	14	0	2	0	3	77
Pueblo	0		0	0	2	1	0	1	0	2	14
New Mexico:											
Albuquerque	0		0	1	0	0	0	2	0	0	9
Arizona:											
Phoenix	0		1	0	0	2	1	2	0	0	-----
Utah:											
Salt Lake City	0		0	0	3	3	0	1	0	0	30
Nevada:											
Reno	0		0	0	0	1	0	0	0	0	7
Washington:											
Seattle	6			0		3	1		3	4	-----
Spokane	2			0		2	1	0	0	0	-----
Tacoma	0		0	0	4	4	1	0	0	0	38
Oregon:											
Portland	0	3	2	1	9	5	0	3	2	0	89
Salem	0	8	-	5	-	0	0	-----	0	0	-----
California:											
Los Angeles	23	103	10	96	29	64	19	17	3	16	344
Sacramento	0	3	2	0	7	1	0	2	1	11	35
San Francisco	2	70	7	0	15	3	0	12	0	29	192

City reports for week ended January 28, 1933—Continued

State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths	
Massachusetts:			
Boston	1	1	0
New York:			
New York	1	1	2
Pennsylvania:			
Philadelphia	0	1	1
Ohio:			
Cincinnati	1	0	0
Cleveland	1	0	0
Toledo	0	0	1
Indiana:			
Indianapolis	2	0	0
Illinois:			
Chicago	14	9	0
Michigan:			
Detroit	1	0	0
Wisconsin:			
Milwaukee	1	0	0
Racine	1	0	0
Iowa:			
Sioux City	1	0	0
Missouri:			
Kansas City	0	1	0
St. Louis	1	0	0
Nebraska:			
Omaha	1	0	0
Maryland:			
Baltimore	1	0	0
District of Columbia:			
Washington	1	0	0
Virginia:			
Norfolk	0	0	1
West Virginia:			
Wheeling	0	0	1
Tennessee:			
Nashville	0	2	0
Alabama:			
Birmingham	1	1	0
Louisiana:			
New Orleans	0	1	1
Oklahoma:			
Tulsa	1	0	0
Washington:			
Seattle	1	0	0
Oregon:			
Portland	1	0	0
California:			
Los Angeles	0	0	2

Lethargic encephalitis.—Cases: Pittsburgh, 1; Detroit, 1; Atlanta, 1.
Dengue.—Cases: Charleston, S. C., 10.
Pellagra.—Cases: Brunswick, 1; Savannah, 1; Birmingham, 1; Montgomery, 1; New Orleans, 2.
Typhus fever.—Cases: Mobile, 1.

FOREIGN AND INSULAR

BRITISH ISLES

Influenza.—During the week ended January 21, 1933, 1,589 deaths from influenza were recorded in the 118 great towns of England and Wales, as compared with 1,041 deaths for the preceding week. The general death rate in these towns rose to 22.2 per 1,000 population as compared with 18.7 for the preceding week. In Greater London the general death rate for the week ended January 21, 1933, was 20.9 per 1,000.[1]

For the week ended January 28, 1933, 84 deaths from influenza were reported in the 16 principal towns of Scotland. The general death rate for these towns for that week was 20.9 per 1,000, as compared with 20.4 for the preceding week. The general death rate in Glasgow dropped from 18 for the week ended January 21 to 17.9 for the week ended January 28.[1]

In Northern Ireland the prevalence of influenza increased during the early part of January. In Belfast the influenza deaths for the first three weeks of the year were 1, 6, and 37, respectively, and the general death rates in Belfast for the three weeks were 14.2, 17.2, and 29.5 per 1,000.

CANADA

Provinces—Communicable diseases—Week ended January 21, 1933.—The Department of Pensions and National Health of Canada reports cases of certain communicable diseases for the week ended January 21, 1933 as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis			1		1	1		1		4
Chicken pox	3	10		173	320	30	15	4	31	589
Diphtheria		3	6	26	33	4	1			73
Erysipelas				1	6				1	8
Influenza	2	28		172	343	238	42		113	938
Lethargic encephalitis					1					1
Measles		16	6	12	514	1	4	15	29	627
Mumps		2			124	26	2		4	158
Paratyphoid fever					1					1
Pneumonia		3			15		8		8	34
Poliomyelitis				1	1					2
Scarlet fever	1	4	2	79	96	18	12	2	9	221
Tuberculosis	1	1	2	82	70	17	1		36	210
Typhoid fever			1	6	7	1			2	17
Undulant fever					1					1
Whooping cough				188	123	15	21	1	28	376

[1] Figures for earlier weeks will be found in the Public Health Reports of Feb. 10, 1933, p. 161.

Quebec Province—Communicable diseases—Four weeks ended January 28, 1933.—The Bureau of Health of the Province of Quebec, Canada, reports cases of certain communicable diseases for the four weeks ended January 28, 1933, as follows:

Disease	Week ended—			
	Jan. 7	Jan. 14	Jan. 21	Jan. 28
Cerebrospinal meningitis		1		1
Chicken pox	107	227	173	135
Diphtheria	28	26	26	41
Erysipelas	4	5		4
German measles	1	3	1	3
Influenza	20	23	172	41
Lethargic encephalitis		1		1
Measles	68	72	41	41
Poliomyelitis	4	4		5
Puerperal septicemia		2		1
Scarlet fever	75	56	79	77
Tuberculosis	34	60	82	49
Typhoid fever	6	15	6	12
Whooping cough	79	142	188	136

CUBA

Habana—Communicable diseases—Four weeks ended January 28, 1933.—During the four weeks ended January 28, 1933, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chicken pox	2		Measles	2	
Diphtheria	17	4	Rabies	1	1
Leprosy	1	1	Tuberculosis	21	4
Malaria [1]	16		Typhoid fever [1]	7	2

[1] Many of these cases are from the interior of the island, outside of Habana.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

(NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the Public Health Reports for January 27, 1933, pp. 101–112. A similar cumulative table will appear in the Public Health Reports to be issued February 24, 1933, and thereafter, at least for the time being, in the issue published on the last Friday of each month.)

Cholera

Philippine Islands.—For the week ended February 4, 1933, cholera was reported in Leyte Province, Philippine Islands as follows: Babatngon, 7 cases, 7 deaths; Barugo, 19 cases, 23 deaths; Baybay, 29 cases, 15 deaths.

Plague

Hawaii Territory.—A fatal case of plague was reported at Kukaiau, Island of Hawaii, January 30, 1933. Death occurred February 3, 1933. Two rats captured January 23 and two rats captured January 24, at the same place have been proved positive for plague. Kukaiau is about 175 miles from Honolulu.

Smallpox

China—Canton.—During the week ended January 28, 1933, 101 cases of smallpox with 7 deaths were reported at Canton, China.

Egypt—Alexandria.—During the week ended January 28, 1933, 192 cases of smallpox with 59 deaths were reported at Alexandria, Egypt.

Typhus Fever

On vessel.—The steamship *Munplace* arrived at New Orleans, January 26, 1933, from Progreso, Mexico, with a member of the crew suffering from typhus fever. Contacts were detained and the vessel was allowed to proceed after fumigation.

UNITED STATES TREASURY DEPARTMENT

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UNITED STATES PUBLIC HEALTH SERVICE

HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst Surg Gen R C WILLIAMS, *Chief of Division*

The PUBLIC HEALTH REPORTS are issued weekly by the United States Public Health Service through its Division of Sanitary Reports and Statistics, pursuant to acts of Congress approved February 15, 1893, and August 14, 1912.

They contain: (1) Current information of the prevalence and geographic distribution of preventable diseases in the United States in so far as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other communicable diseases throughout the world. (2) Articles relating to the cause, prevention, or control of disease. (3) Other pertinent information regarding sanitation and the conservation of the public health.

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PUBLIC HEALTH REPORTS

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THE QUANTITATIVE DETERMINATION OF QUARTZ ("FREE SILICA") IN DUSTS

By ADOLPH KNOPF, *Professor of Physical Geology, Yale University*, and *Consultant, United States Public Health Service*

Research in the field of dust inhalation has demonstrated that, in general, the degree of health hazard associated with the inhalation of any dust, all other factors remaining constant, is dependent upon the mineral composition of the dust. For example, it has been found that the harmfulness of a quartz-containing dust is usually in direct proportion to its quartz content. For this reason, in attempting to evaluate the harmfulness of a dust it is of great importance to ascertain its exact mineral composition.

The present contribution describes the technique employed in studying the mineral composition of quartz-containing dusts and indirectly demonstrates the principle involved in similar analysis of other dusts, although it is impossible to present any one technique that will apply to all dusts irrespective of their composition.

SILICA

Silica is the name given to the chemical compound silicon dioxide (SiO_2). It occurs in nature most commonly in the crystalline form as the mineral quartz Several other minerals are also composed of silica, for example, tridymite, cristobalite, opal, and chalcedony; but in comparison with quartz they are relatively rare

A long-established convention has led to the reporting of chemical analyses of rocks and minerals in terms of certain chemical compounds (usually oxides) rather than in terms of chemical elements. During analysis the silicon is isolated in the form of silica, and consequently the chemical analysis of an average granite, for example, is reported as containing 70 per cent of silica. About 30 per cent, or roughly one-third, of the entire granite consists of quartz, whereas the other two-thirds of the granite is made up chiefly of minerals that are complex salts of silicon-bearing acids. Such minerals are known as silicates. The remainder of the silica reported in the chemical analysis of the

granite, amounting to 40 per cent, is locked up in these silicate minerals, chiefly feldspar and mica.

The distinction between free silica and combined silica.—This arbitrary convention of reporting rock and mineral analyses in terms of oxides has necessitated the use of the expressions "free silica" and "combined silica" to distinguish between the silica that makes up quartz (or the few other minerals that are composed of silica alone) and the silica that is combined with other elements in the various silicate minerals. In the granite just cited the 70 per cent of total silica is the sum of 30 per cent of free silica plus 40 per cent of combined silica.

As the danger of silicosis to workers in certain dusty trades is attributed chiefly to the amount of *free* silica present in the dust in the form of quartz rather than to the silica that is in chemical combination, it has become necessary to devise a method for determining accurately how much of the dust in a given sample consists of quartz. For example, in the dust arising from cutting a granite whose chemical analysis shows 70 per cent of total silica the percentage of free silica will be far less than 70, since only one-third of the granite is made up of quartz. Furthermore, rocks and minerals can show as much as 68 per cent of silica, although they contain no free silica (quartz). In short, the total silica reported in customary chemical analysis is no measure of the amount of free silica.

Determination of free silica (quartz) in rocks.—In general, it is comparatively easy to determine the percentage of quartz in a rock specimen by petrographic methods, because it is easy for a petrographer to distinguish between quartz and other minerals by the use of a polarizing microscope, or petrographic microscope, as it is more commonly called.

Preparation of material.—The determination can be made in two ways, viz, (1) by examining a thin section of the rock ground to a thickness of approximately 0.03 mm and mounted in Canada balsam upon a glass slide, or (2) by studying a pulverized fragment of the rock, prepared by crushing the material to a powder whose individual grains are about 0.06 mm in thickness. Portions of the powder are then successively immersed in oils of known refractive indices until a point is reached where in one position of the microscopic stage the boundary between the grains and the liquid disappears. This occurs when a refractive index of the mineral is the same as the index of the liquid in which it is immersed. In this way the refractive index (if the mineral is uniaxial) or refractive indices (if biaxial) can be numerically determined, together with other optical properties. This method of studying powdered rock and mineral fragments is known as the immersion method.

Criteria for petrographic identification of minerals.—The petrographic identification of minerals depends upon the following optical properties:

1. Color.
2. Pleochroism, in minerals that show selective absorption of light
3. Crystal form
4. Cleavage.
5. Refractive indices and relief
6. Birefringence: Numerical value
7. Isotropy or anisotropy: Extinction (complete, parallel, or inclined)
8. Optical character of the mineral.
9. Optical elongation of principal zones
10. Optical orientation of mineral.
11. Value of optic axial angle
12. Twinning
13. Inclusions
14. Alteration products

No one of the preceding criteria alone is sufficient to determine a mineral, although one criterion may be enough to distinguish it from some other mineral with which it is associated. Some minerals can be identified by determining three or four optical properties; others require more for conclusive determination.

The methods of determining the optical properties require a familiarity with the difficult principles of optics and a special laboratory training in petrography. The reader who desires further information about the detailed technique of the petrographic identification of minerals is referred to the standard works on optical mineralogy, such as Rosenbusch's Mikroskopische Physiographie der petrographisch wichtigen Mineralien, vol. 1, part 1, revised by Wülfing; Elements of Optical Mineralogy, by A. N. Winchell; Rock Minerals, by J. P. Iddings; Manual of Petrographic Methods, by A. Johannsen; or Dana's Textbook of Mineralogy, fourth edition, by W. E. Ford. For a comprehensive description of the immersion method of studying minerals the reader is referred to The Microscopic Determination of the Nonopaque Minerals, by E. S. Larsen.

Quantitative determination.—An easy and satisfactory way to determine the percentage of any mineral in a rock section is by the Rosiwal method. This method consists in measuring the linear intercepts of a given mineral along numerous parallel lines. The ratio between the sum of all the intercepts of quartz to the length of the measured traverse gives the percentage of quartz, because, as can be shown mathematically, the linear intercepts are proportional to volumes. The measurement is carried out by the use of a screw micrometer, ocular, or a mechanical stage. The Rosiwal method can be applied both to rock sections and to rock powders examined by the immersion method.

DETERMINATION OF QUARTZ IN DUSTS

It is comparatively easy for the petrographer to apply the methods described above in making a quantitative determination of quartz in thin sections of rocks or in rock powders; but in dusts where the indi-

vidual particles are of the order of magnitude of 0.005 mm (5 microns) in diameter, petrographic examination of the material must be supplemented by other methods, because the minimum grain size that can be conclusively identified under the petrographic microscope is about 0.010 mm (10 microns) in diameter.

The results of quantitative dust analysis can be conclusive only when several methods are used on the same material, thereby checking one against the other, and the accuracy of the final result depends largely on the skill and experience of the analyst, because each sample to be analyzed presents an individual problem.

The general method that has been found highly satisfactory is a combined chemical and petrographic procedure by which all the constituents other than quartz are eliminated from the material. The accuracy of any method of quantitative estimate is much greater where the estimate is applied to two constituents than where many constituents are present. Therefore, by concentrating the quartz a large factor of error in quantitative determination is eliminated. If the dust is chiefly composed of quartz, the elimination of foreign constituents is not difficult. If the quartz is in smaller amount than the other constituents, a clean concentration may be more difficult. But a satisfactory quantitative estimate can always be made on a moderately clean quartz concentrate, because the mineral present in marked excess can be much more accurately determined than the other constituents.

For the fine dusts whose individual particles can not be satisfactorily determined, chemical methods are necessary in order to remove the constituents other than quartz. Various methods are used, dependent upon the composition of the dust; but the first step in the analysis is to examine a small portion of the material under the petrographic microscope.

Preliminary petrographic examination of the dust.—It is a common practice to cite the percentage of silica in the chemical analysis of a dust as a measure of the quartz present. The erroneous nature of this conclusion has been already emphasized. The only value of the chemical analysis to the dust analyst is based upon the fact that the amount of silica locked up in the various silicate minerals in the dust can be calculated from the percentages of bases (K_2O, Na_2O, CaO, etc.) that are shown by the analysis. The percentage of silica that remains after all the bases in the various silicate minerals have been satisfied should represent the free silica present.

This method of computation is useless, however, unless the mineral composition of the dust has been determined petrographically. For example, in potassium feldspar, which is a common constituent of all granites, every molecule of potash is combined with 6 molecules of silica. If the only minerals in the dust are quartz and potassium

feldspar, obviously the silica left over after the potash in the analysis is computed as feldspar will be an accurate measure of the quartz present. But if, as is often true, the dust is made up of several potassium-bearing minerals, such as potassium feldspar, biotite, and muscovite, it is impossible to compute how much silica is required to satisfy the potash, because neither the relative proportions of the various minerals are known nor are their compositions known. Most rock-forming silicate minerals have wide ranges in their chemical composition.

As the chemical analysis of a dust can serve only as a rough guide to the possible amount of quartz present, it can not be too strongly emphasized that a careful petrographic examination is an indispensable prerequisite to the quantitative determination of quartz in a dust sample; for, although it may be impossible to make an accurate quantitative determination of extremely minute individual grains by petrographic methods, it has proved possible in all the samples so far examined to obtain a clear idea of the general composition of the dust by a petrographic examination. The analytical method best suited to the individual sample can then be selected. For example, if the dust shows under the microscope a large admixture of organic material, a preliminary sample should be ignited and the residue again examined under the microscope in order to decide on the further procedure. If the dust shows a large amount of metallic mineral, free iron may be extracted by a magnet or the sample may be heated with hydrochloric acid to remove the iron oxide and such metallic particles as brass shavings from brass-work dust. Dust from marble works containing chiefly particles of carbonate minerals should be heated with hydrochloric acid to dissolve the carbonate, and the residue should then be examined with the petrographic microscope. The most difficult problem is the separation of quartz in rock or mineral dusts that contain silicate minerals, such as granite, slate, or asbestos dust. The procedure employed to separate the quartz in such material depends upon the fact that cold hydrofluosilicic acid, H_2SiF_6, will in time decompose the silicate minerals but will not attack quartz.

After the preliminary petrographic examination, the procedure in the chemical separation of quartz is as follows:

Grinding.—In order to facilitate the action of the hydrofluosilicic acid, the material is ground to pass a 150-mesh sieve, thus insuring uniformity of size and a large surface for treatment.

Weighing.—It is then weighed in a platinum crucible. About half a gram makes a convenient amount to work with.

Ignition.—If the preliminary microscopic examination indicates the presence of any organic material, the platinum crucible and its contents are carefully heated to white heat for 30 minutes to burn off the organic matter. It is then cooled. Dusts that are strongly contami-

nated with oil are digested for 5 minutes with ether, then filtered, and ignited for half an hour to an hour.

Hydrochloric acid treatment.—If the preliminary examination shows the presence of carbonate minerals, hydrochloric acid is added to the contents of the platinum crucible and the crucible is gently heated. The contents of the crucible are filtered, washed, and the filter paper and precipitate are ignited in the same platinum crucible, which is then allowed to cool.

Hydrofluosilicic acid treatment.—After these operations hydrofluosilicic acid in moderate excess is added to the material in the platinum crucible. If the composition of the dust is such that the ignition and hydrochloric acid treatment are unnecessary, the hydrofluosilicic acid is added to the substance to be analyzed immediately after the first weighing. The crucible is carefully covered and set away in a place where the temperature is reasonably constant and *not above room temperature.* Care must be exercised not to raise the temperature during the hydrofluosilicic acid treatment, because hydrofluosilicic acid (H_2SiF_6) decomposes on heating into silicon tetrafluoride (SiF_4) and hydrofluoric acid (HF), which will readily attack the free silica. It is left for a time that ranges in different specimens from 24 to 48 or even 72 hours.

It is then carefully decanted into an ashless filter paper, and the crucible contents are thoroughly washed on to the filter paper. The precipitate is washed until the wash water gives no precipitate in a clear mixture of dilute KCl with 95 per cent alcohol. The precipitate is dried, ignited in the platinum crucible, and weighed, and the percentage loss in weight noted.

The hydrofluosilicic acid treatment is repeated until the weight of the residue remains unchanged.

Microscopic examination of residue. A small portion of the residue is then examined under the petrographic microscope. If minerals other than quartz are present, the amount of quartz in the residue can be estimated with a reasonable degree of accuracy. If quartz is the only mineral indicated by the microscopic examination, the percentage of quartz in the sample can be calculated directly from the weight of the residue.

Volatilization of residue with hydrofluoric acid.—A check on the microscopic determination of quartz is given by volatilizing the residue with hydrofluoric acid in the platinum crucible. Free silica volatilizes completely with hydrofluoric acid. Combined silica in silicate minerals volatilizes with hydrofluoric acid, but after the treatment a residue remains made up of the bases that were in combination in the silicates. If no residue is left after the hydrofluorization, the material was all quartz.

RATE OF DECOMPOSITION OF QUARTZ ON PROLONGED TREATMENT WITH HYDROFLUOSILICIC ACID

As the rate of decomposition was found to differ considerably in different silicates, a control test was run on pure quartz in order to determine the error introduced into quantitative analyses by prolonged treatment of quartz with H_2SiF_6 at room temperature during analyses of dusts that contain refractory silicates requiring a week or more to decompose.

The following table shows the results of a test[1] on 0.509 gm of pure quartz ground to pass a 150-mesh screen:

Quartz (original weight before treatment with H_2SiF_6=0.509 gm)

Time in days	Loss after treatment	Per cent loss in weight	Rate of loss in weight per day in per cent of original weight	
	Grams			
5	0.015	2.9	0.59	Average—0.7 per cent per day is rate of loss in original weight.
7	.024	4.7	.67	
10	.037	7.3	.73	
12	.049	9.6	.80	
14	.057	11.1	.78	

By using the above factor of error it is possible to compute at the end of an analysis the maximum possible loss in weight of quartz originally present, thus obtaining a maximum figure for quartz.

SUMMARY

The quartz content of fine dusts is determined by a combination of petrographic and chemical methods.

A preliminary petrographic examination is essential in order to determine the mineral composition of the dust. It is impossible to estimate the amount of quartz in a dust from a chemical analysis alone, because the silica reported in the chemical analysis comprises not only the free silica occurring in the form of quartz but also the combined silica locked up in various silicate minerals. Therefore, the actual minerals making up a dust must always be determined, and this can generally be done readily by petrographic methods.

It is difficult to make a reliable quantitative estimate of extremely minute particles by a microscopic examination. Therefore, chemical methods are used to separate the quartz from the associated constituents in dusts of mixed composition. The quartz is then weighed and this result is checked by petrographic examination and by chemical methods in order to insure that the separated material has been correctly identified. The few minerals other than quartz that may occur in the residue can readily be estimated quantitatively under the microscope, and this estimate is subtracted as a minor correction. Petrographic examination of the dust both at the beginning and the end of the analysis is an indispensable check upon the progress of the

[1] By Eleanora F. Knopf

chemical treatment. In the case of dusts carrying a relatively small proportion of quartz and containing difficultly soluble silicates and, hence, requiring a long time for chemical decomposition, it has proved desirable to check the procedure by petrographic examination at frequent intervals during the course of the treatment.

Each dust presents individual problems in regard to the purification of the sample to be analyzed, the methods of eliminating the various mineral constituents, etc., and therefore the best procedure in analyzing a given dust must be selected after the minerals and other constituents making up the dust have been identified. Consequently, it is impossible to set forth any one technique that will apply to all dusts regardless of their composition.

COURT DECISION RELATING TO PUBLIC HEALTH

Quarantine of person believed to be venereally infected.—(California District Court of Appeal, Second District, Div. 2; Ex parte King, 16 P. (2d) 694; decided Dec. 2, 1932.) The following is the opinion in a case holding that a person may be detained in quarantine where there is probable cause to believe that such person is venereally infected:

The petitioner asks to be released through habeas corpus from detention by the chief of police of the city of Los Angeles. She was arrested on a morals charge, examined physically in the usual course by employees of the health department, and it appears that such examination indicated that she was afflicted with a venereal disease. This fact, however, she disputes, has demanded another examination, which has been denied, and refuses to undergo medical treatment. The health department has required her detention in quarantine until such time as she may safely be released. We are of the opinion that the law only requires that there be probable cause to believe that a person so held has an infectious disease which is communicable in order to justify the authorities in retaining such person in quarantine. The person so held may be detained legally until there is sufficient showing that the probable cause no longer exists.

An order has heretofore been made remanding the petitioner and dismissing the writ.

DEATHS DURING WEEK ENDED FEBRUARY 4, 1933

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Feb. 4, 1933	Corresponding week,
Data from 85 large cities of the United States:		
Total deaths	8,635	8,285
Deaths per 1,000 population, annual basis	12.1	11.8
Deaths under 1 year of age	695	610
Deaths under 1 year of age per 1,000 estimated live births [1]	50	49
Deaths per 1,000 population, annual basis, first 5 weeks of year	12.9	12.0
Data from industrial insurance companies:		
Policies in force	69,100,292	71,038,950
Number of death claims	15,663	13,795
Death claims per 1,000 policies in force, annual rate	11.8	9.7
Death claims per 1,000 policies, first 5 weeks of year, annual rate	11.8	10.0

[1] 1933, 81 cities; 1932, 78 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks ended February 11, 1933, and February 13, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended February 11, 1933, and February 13, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Feb. 11, 1933	Week ended Feb. 13, 1932	Week ended Feb. 11, 1933	Week ended Feb. 13, 1932	Week ended Feb. 11, 1933	Week ended Feb. 13, 1932	Week ended Feb. 11, 1933	Week ended Feb. 13, 1932
New England States:								
Maine	4	4	228	31		625	1	0
New Hampshire		1				20	0	0
Vermont	1				5	143	0	0
Massachusetts	25	57	10	13	201	373	0	0
Rhode Island	1	8	11			991	0	0
Connecticut	3	6	87	9	148	207	2	0
Middle Atlantic States:								
New York	65	146	176	181	1,997	1,461	6	8
New Jersey	24	49	53	57	631	104	2	4
Pennsylvania	85	128			970	1,806	3	4
East North Central States:								
Ohio	28	102	10	97	709	678	0	2
Indiana	13	56	175	75	9	102	2	4
Illinois	42	125	71	117	169	111	18	13
Michigan	28	40	25	9	711	441	4	2
Wisconsin	6	12	311	122	216	199	1	0
West North Central States:								
Minnesota	4	8	3	2	611	26	0	0
Iowa	10	17		4		6	1	0
Missouri	31	39	18	40	159	48	4	0
North Dakota		1	28		73	116	1	0
South Dakota	3	3		1,200	13	18	0	0
Nebraska	13	12		16	4	32	0	4
Kansas	8	31	65	43	205	96	2	0
South Atlantic States:								
Delaware	2		3	1			0	0
Maryland [2]	10	34	132	14	4	21	0	0
District of Columbia	9	8	5	3	1	5	3	0
Virginia	24				414		3	
West Virginia	9	26	481	52	456	887	1	0
North Carolina	13	25	270	10	278	201	2	2
South Carolina	10	11	2,097	595	21	29	9	0
Georgia [3]	5	12	414	144	4	4	0	1
Florida	12	16	184	1	11	1	0	4

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended February 11, 1933, and February 13, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Feb. 11, 1933	Week ended Feb. 13, 1932	Week ended Feb. 11, 1933	Week ended Feb. 13, 1932	Week ended Feb. 11, 1933	Week ended Feb. 13, 1932	Week ended Feb. 11, 1933	Week ended Feb. 13, 1932
East South Central States:								
Kentucky	22	49	161	361	79	50	0	2
Tennessee	3	22	201	301	86	47	0	1
Alabama [3]	32	46	298	54	1	3	2	2
Mississippi	5	12					1	0
West South Central States:								
Arkansas	11	6	347	31	19	6	0	0
Louisiana [3]	17	35	16	14	14	26	2	3
Oklahoma [4]	9	44	273	804	10	19	1	0
Texas [3]	72	60	170	202	502	48	5	0
Mountain States:								
Montana		4	185	1,138	149	30	0	0
Idaho		2	3		25	2	0	1
Wyoming				202	30	2	0	0
Colorado	4	13	73		10	37	2	1
New Mexico	10	14	9	64	14	55	1	0
Arizona	7	5	40	58		2	1	0
Utah [2]	4				1		1	3
Pacific States:								
Washington	3	4		2	25	488	0	0
Oregon	5	3	175	323	140	55	0	0
California	64	64	183	371	363	358	2	5
Total	786	1,363	7,304	6,721	9,651	9,515	83	69

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Feb. 11, 1933	Week ended Feb. 13, 1932	Week ended Feb. 11, 1933	Week ended Feb. 13, 1932	Week ended Feb. 11, 1933	Week ended Feb. 13, 1932	Week ended Feb. 11, 1933	Week ended Feb. 13, 1932
New England States:								
Maine	0	0	35	32	0	0	1	0
New Hampshire	0	0	50	42	0	1	0	1
Vermont	0	0	13	19	0	20	0	1
Massachusetts	0	0	383	471	0	0	0	7
Rhode Island	0	0	32	53	0	0	0	0
Connecticut	0	0	98	71	2	12	2	1
Middle Atlantic States:								
New York	1	6	783	1,213	0	1	8	6
New Jersey	0	2	331	244	0	0	3	3
Pennsylvania	0	0	816	833	0	0	1	23
East North Central States:								
Ohio	0	1	355	501	5	45	3	7
Indiana	0	1	129	106	0	13	5	2
Illinois	1	4	393	462	9	6	3	17
Michigan	1	1	527	364	0	2	4	2
Wisconsin	0	1	122	123	8	3	2	0
West North Central States:								
Minnesota	0	0	83	120	0	0	1	4
Iowa	0	0	38	59	51	79	0	0
Missouri	1	0	77	49	0	17	2	2
North Dakota	0	1	8	19	0	6	0	0
South Dakota	0	0	11	9	2	8	0	0
Nebraska	0	0	23	33	3	16	0	1
Kansas	0	0	50	64	0	1	1	0
South Atlantic States:								
Delaware	0	1	8	17	0	0	0	2
Maryland [2]	0	1	97	108	0	0	3	6
District of Columbia	0	0	11	23	0	0	0	1
Virginia	0		42		0		4	
West Virginia	4	2	38	46	0	0	5	13
North Carolina	1	1	48	52	1	2	2	4
South Carolina	0	1	5	5	0	1	0	8
Gerogia [4]	0	0	10	24	0	0	2	14
Florida	0	0	14	4	0	0	9	5

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended February 11, 1933, and February 13, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Feb. 11, 1933	Week ended Feb. 13, 1932	Week ended Feb. 11, 1933	Week ended Feb. 13, 1932	Week ended Feb. 11, 1933	Week ended Feb. 13, 1932	Week ended Feb. 11, 1933	Week ended Feb. 13, 1932
East South Central States:								
Kentucky	0	2	40	66	0	5	6	17
Tennessee	0	0	26	44	0	31	3	8
Alabama [3]	2	2	23	18	0	2	4	13
Mississippi	0	0	11	8	2	11	6	5
West South Central States:								
Arkansas	1	0	17	37	10	16	1	6
Louisiana [3]	2	0	12	16	2	5	5	7
Oklahoma [4]	1	0	23	58	7	3	2	6
Texas	2	0	48	72	45	16	9	6
Mountain States:								
Montana	0	0	13	44	1	3	0	2
Idaho	0	0	1	10	8	3	0	0
Wyoming	0	0	4	4	0	0	0	0
Colorado	0	0	26	23	0	0	1	2
New Mexico	0	1	11	15	0	8	2	0
Arizona	0	0	25	3	0	0	2	0
Utah [2]	0	0	8	7	0	0	0	0
Pacific States:								
Washington	0	2	42	28	6	18	4	0
Oregon	0	0	27	20	2	18	0	1
California	1	2	195	129	39	8	5	7
Total	18	32	5,224	5,777	203	392	105	210

[1] New York City only.
[2] Week ended Friday.
[3] Typhus fever, week ended February 11, 1933, 8 cases: 4 cases in Georgia, 2 cases in Alabama, 1 case in Louisiana and 1 case in Texas.
[4] Figures for 1933 are exclusive of Oklahoma City and Tulsa, and for 1932 are exclusive of Tulsa only.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week:

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
January, 1933										
Connecticut	2	29	1,158	----	375	-	0	475	4	3
Indiana	18	226	2,431	----	53	1	1	511	12	10
Iowa	19	62	1,497	----	10	----	0	142	88	7
Maine	----	5	3,457	----	3	----	6	139	0	2
Nebraska	5	51	627	----	41	----	2	143	15	1
New Mexico	2	35	27	----	17	1	1	67	0	12
Pennsylvania	19	476	----	----	2,233	----	4	3,582	0	31
Vermont	----	11	----	----	7	----	0	91	0	1
Wyoming	----	2	26	----	81	----	0	39	1	0

January, 1933

	Cases
Anthrax:	
Nebraska	1
Pennsylvania	1
Chicken pox:	
Connecticut	650
Indiana	386
Iowa	204
Maine	251
Nebraska	184
New Mexico	90
Pennsylvania	4,465
Vermont	200
Wyoming	23
Conjunctivitis, infectious:	
Connecticut	1
New Mexico	1
Dysentery:	
Iowa (amebic)	1
German measles:	
Connecticut	3
Maine	17
New Mexico	3
Pennsylvania	45
Impetigo contagiosa:	
Iowa	1
Lethargic encephalitis:	
Connecticut	2
Iowa	1
Pennsylvania	5
Mumps:	
Connecticut	250
Indiana	145
Iowa	129
Maine	41
Nebraska	82
New Mexico	115
Pennsylvania	1,800
Vermont	193
Wyoming	2
Ophthalmia neonatorum:	
Pennsylvania	3
Puerperal septicemia:	
Pennsylvania	10
Rabies in animals:	
Connecticut	1
Maine	4
New Mexico	2
Septic sore throat:	
Connecticut	2
Iowa	2
Maine	4
Nebraska	6
Vermont	8
Tetanus:	
Pennsylvania	1
Trachoma:	
Indiana	1
Trichinosis:	
Pennsylvania	1
Tularaemia:	
Indiana	1
Pennsylvania	4
Undulant fever:	
Connecticut	4
Indiana	6
Iowa	5
Maine	2
Pennsylvania	2
Vermont	1
Vincent's angina:	
Maine	10
New Mexico	1
Whooping cough:	
Connecticut	337
Indiana	117
Iowa	31
Maine	99
Nebraska	16
New Mexico	38
Pennsylvania	877
Vermont	105
Wyoming	17

WEEKLY REPORTS FROM CITIES

City reports for week ended February 4, 1933

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	0	3	0	0	4	8	0	0	1	15	27
New Hampshire:											
Concord	0	----	2	0	3	0	0	2	0	0	16
Manchester	0	----	0	0	2	9	0	1	0	0	12
Nashua	0	----	0	0	0	0	0	0	0	0	--
Vermont:											
Barre	0	----	0	0	0	0	0	0	0	0	1
Burlington	0	----	0	0	0	3	0	0	0	0	14
Massachusetts:											
Boston	12	8	6	49	52	78	0	12	0	58	278
Fall River	0	9	8	2	5	6	0	2	0	5	50
Springfield	0	2	2	2	5	5	0	2	0	5	38
Worcester	3	----	0	4	7	25	0	3	0	10	65
Rhode Island:											
Pawtucket	0	----	0	0	1	0	0	0	0	0	17
Providence	5	6	3	0	14	20	0	1	0	5	71

City reports for week ended February 4, 1933—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Connecticut:											
Bridgeport	1	13	3	4	7	1	0	0	0	0	36
Hartford	1	8	1	0	15	3	0	1	0	5	50
New Haven	0	1	2	2	1	8	0	0	0	12	58
New York:											
Buffalo	2	-----	8	4	19	38	0	2	0	43	126
New York	41	81	30	612	216	231	0	96	9	75	1,570
Rochester	0	16	2	0	7	10	0	2	0	5	86
Syracuse	0	35	2	3	5	27	0	0	0	2	46
New Jersey:											
Camden	6	2	2	0	0	14	0	2	0	0	39
Newark	1	28	1	202	17	26	0	3	1	26	121
Trenton	1	9	1	8	5	22	0	6	0	2	41
Pennsylvania:											
Philadelphia	6	46	18	40	51	146	0	27	1	6	537
Pittsburgh	7	8	3	4	13	52	0	8	0	37	159
Reading	3	------	0	67	4	5	0	1	0	0	32
Scranton	0	------	0	1	------	12	0	------	0	4	------
Ohio:											
Cincinnati	4	------	7	0	7	13	0	4	1	5	104
Cleveland	6	82	0	0	10	136	0	10	0	37	164
Columbus	3	3	3	101	2	8	0	2	0	2	69
Toledo	0	2	1	114	5	28	0	6	0	17	71
Indiana:											
Fort Wayne	6	------	0	0	1	2	0	1	0	0	16
Indianapolis	4	------	2	12	18	10	0	6	0	20	------
South Bend	0	------	0	0	2	2	0	2	1	6	13
Terre Haute	1	------	0	0	2	6	0	0	0	0	20
Illinois:											
Chicago	6	13	6	166	62	266	0	41	1	34	688
Springfield	2	1	0	0	1	2	0	0	0	0	19
Michigan:											
Detroit	17	10	6	215	26	132	0	21	1	93	242
Flint	2	29	1	1	4	3	0	1	1	1	27
Grand Rapids	0	------	4	0	2	9	0	0	0	38	34
Wisconsin:											
Kenosha	0	------	0	0	0	1	8	0	0	14	7
Madison	0	------	------	29	------	2	0	------	0	1	------
Milwaukee	1	4	5	2	3	40	0	7	0	44	109
Racine	2	1	1	0	1	6	0	0	0	5	10
Superior	0	------	0	0	0	1	0	1	0	1	8
Minnesota:											
Duluth	0	------	0	10	1	0	0	0	0	19	15
Minneapolis	4	------	5	593	11	27	0	2	0	10	105
St. Paul	1	1	1	47	6	8	0	2	0	50	58
Iowa:											
Des Moines	9		------	0	------	3	0	------	0	0	22
Sioux City	2	------	------	0	------	0	0	------	0	2	------
Waterloo	0	------	------	0	------	3	0	------	0	0	------
Missouri:											
Kansas City	2	------	4	247	19	46	0	5	0	6	116
St. Joseph	2	------	1	0	4	3	0	0	0	0	21
St. Louis	21	4	3	3	7	26	0	12	1	5	238
North Dakota:											
Fargo	0	------	0	0	1	1	0	0	0	0	4
Grand Forks	0	------	0	1	0	1	0	0	0	0	------
South Dakota:											
Aberdeen	0	------	0	0	0	6	0	0	0	0	------
Sioux Falls	0	------	0	0	0	0	0	0	0	0	8
Nebraska:											
Omaha	3	------	0	4	6	15	3	3	0	1	56
Kansas:											
Topeka	0	------	1	14	8	3	0	1	0	0	11
Wichita	1	------	1	0	8	3	0	0	0	1	29
Delaware:											
Wilmington	1	------	0	0	9	3	0	0	1	0	43
Maryland:											
Baltimore	5	35	5	3	30	53	0	14	0	21	244
Cumberland	0	------	0	0	0	3	0	0	0	0	9
Frederick	1	------	0	0	0	0	0	0	0	0	3
District of Col.:											
Washington	4	4	2	4	18	13	0	9	1	2	167
Virginia:											
Lynchburg	1	------	0	0	1	0	0	0	0	0	9
Norfolk	1	------	0	0	7	1	0	1	0	1	41
Richmond	1	------	0	0	5	0	0	2	0	0	56
Roanoke	0	------	1	155	1	0	0	0	1	0	7

City reports for week ended February 4, 1933—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
West Virginia:											
Charleston	0	1	0	0	1	0	0	1	0	1	
Huntington	1		0	2	0	1	0	0	0	0	
Wheeling	0		0	13			0	1	0	1	3
North Carolina:											
Raleigh	0		0	1	4	4	0	1	0	0	1
Wilmington	0		0	7		0	0	0	0		10
Winston-Salem	0	1	1	0	0		0	0	0	1	11
South Carolina:											
Charleston	0	200	5	0	1	1	0	1	0	0	0
Columbia	1		0	0	8	0	0		0	0	26
Greenville	0		0	0	0	0	0	0	0	1	
Georgia:											
Atlanta	3	8	1	1			0	6	3	0	63
Brunswick	0		0	0	2	0	0	0	0	0	6
Savannah	0	130	5	1	1	0	0	0	0	0	1
Florida:											
Miami	2	5	3	0	1	0	0	2	0		10
Tampa	1	2	3	0	4	0	0	0	0	0	28
Kentucky:											
Ashland	0	1	0	1	0	1	0	0	0	0	
Lexington	0		0	2	5	0	0		0	0	16
Louisville	8	2	0	1	12	3	0	0	5	1	91
Tennessee:											
Memphis	4		1	0		3	0	0		3	76
Nashville	0		4	0	3		0		0	0	33
Alabama:											
Birmingham	5	10	1	0	3	3	0		1	3	53
Mobile	0		2	0	0	0	0	0	1	0	24
Montgomery	0		0	0		2	0		0	0	
Arkansas:											
Fort Smith	0			0	0	1	0		0	0	
Little Rock	0		1	0	6	0	0	3	1	0	10
Louisiana:											
New Orleans	6	3	3	0	5	3	0	13	0	5	143
Shreveport	0		0	0	9	1	0	7	0	0	6
Oklahoma:											
Muskogee	0	5	0	0	0	0	0	0	0	0	
Tulsa	1		0	0	0		2	0	0	3	1
Texas:											
Dallas	14	3	3	16	8	3	1	4	0	0	61
Fort Worth	0		0	23	7		1	1	0	0	37
Galveston	1		0	0	1	0	0	1	1	0	11
Houston	4		1	23	10	9	1			0	3
San Antonio	2		2	1	8	2	0	2	0	0	6
Montana:											
Billings	0		0	1	0	0	0	0	0	0	7
Great Falls	0		0	1	0	0	0	1	0	0	7
Helena	0	16	0	0	0	0	0	0	0	0	3
Missoula	0		0	0		0	0	0	0	0	6
Idaho:											
Boise	0		1	16	0	0	0	0	0	0	7
Colorado:											
Denver	1		3	6	11	11	0	8	0	0	90
Pueblo	0		0	0	3	0	0	1	0	1	8
New Mexico:											
Albuquerque	0		0	0	5	0	0	7	0	2	12
Arizona:											
Phoenix	0		0	4	5	1	0	1	0	0	
Utah:											
Salt Lake City	0		1	0	1	3	0	2	0	0	27
Nevada:											
Reno	0		0	0	0	0	0	0	0	0	3
Washington:											
Seattle	2			0		3	1		0	2	
Spokane	0			0		0	0		0	0	
Tacoma	0		0	0	7	5	1	0	0	0	38
Oregon:											
Portland	1	5	2	1	5	0	1	5	1	0	85
Salem	0	6		20		0	0		0	0	
California:											
Los Angeles	23	73	4	121	27	48	13	20	1	25	283
Sacramento	0		0	0	6	0	0	3	0	7	37
San Francisco	0	96	4	1	21	5	0	11	0	40	180

City reports for week ended February 4, 1933—Continued

State and city	Meningococcus meningitis Cases	Meningococcus meningitis Deaths	Polio-myelitis cases	State and city	Meningococcus meningitis Cases	Meningococcus meningitis Deaths	Polio-myelitis cases
New York:				Kansas:			
New York		2	0	Topeka	0	1	0
Pennsylvania:							
Philadelphia	3	[illegible]	0	District of Columbia:			
				Washington	0	1	0
Indiana:				West Virginia:			
Indianapolis	2	1	0	Wheeling	0	0	2
Illinois:				Georgia:			
Chicago	12	[illegible]	0	Atlanta	1	0	0
Michigan:							
Detroit	2	2	0	Kentucky:			
Wisconsin:				Louisville	1	0	0
Milwaukee	1	0	0				
				Louisiana:			
Minnesota:				New Orleans	1	1	0
Duluth	0	1	0	Oklahoma:			
Iowa:				Tulsa	0	1	0
Sioux City	2	0	0	Texas:			
Missouri:				Fort Worth	1	0	1
Kansas City	1	0	0				
St. Joseph	1	0	0	Oregon:			
St. Louis	1	0	0	Portland	0	1	0
Nebraska:				California:			
Omaha	1	0	0	Sacramento	0	1	0

Dengue.—Cases: Charleston, S. C., 1.
Lethargic encephalitis.—Cases: Chicago, [illegible]; Detroit, 1.
Pellagra.—Cases: Charleston, S. C., [illegible]; Savannah, 1; Birmingham, 1; New Orleans, 1.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Week ended January 28, 1933.—The Department of Pensions and National Health of Canada reports cases of certain communicable diseases for the week ended January 28, 1933, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				1	5					6
Chicken pox	2	7		135	282	46	3	3	66	514
Diphtheria			5	41	10	4	6		2	68
Dysentery					1		1			2
Erysipelas		1		4	1	1		1	2	10
Influenza	3	51		41	503	2			57	657
Lethargic encephalitis				1						1
Measles		12	7	41	389	7	1	3	45	508
Mumps					243	6	1		28	278
Pneumonia		2			25		1		2	30
Poliomyelitis			1	5						6
Scarlet fever		7	15	77	98	20	9	7	10	243
Smallpox							3			3
Trachoma									1	1
Tuberculosis			2	49	39	6	2	7	13	118
Typhoid fever			4	12	4	7	1	1	2	31
Whooping cough				136	47	29	11	1	26	250

CUBA

Provinces—Communicable diseases—Four weeks ended January 7, 1933.—During the four weeks ended January 7, 1933, cases of certain communicable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana	Matanzas	Santa Clara	Camaguey	Oriente	Total
Chicken pox		2					2
Diphtheria	2	15	5	2	4	2	30
Hookworm disease						1	1
Malaria	6	26	107	424	80	12	655
Measles	2	2	1	4	47	1	57
Scarlet fever		2					2
Tuberculosis	13	7	6	7			33
Typhoid fever	3	11	1	12	3	6	36

MEXICO

Tampico—Communicable diseases—January, 1933.—During the month of January, 1933, certain communicable diseases were reported in Tampico, Mexico, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	1		Paratyphoid fever	1	
Enteritis, various	48	30	Tuberculosis		36
Influenza	83	30	Typhoid fever	2	1
Malaria	192	4	Whooping cough	19	

PANAMA CANAL ZONE

Communicable diseases—December, 1932.—During the month of December, 1932, certain communicable diseases, including imported cases, were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chicken pox	5		Meningococcus meningitis	2	2
Diphtheria	8	1	Pneumonia		22
Dysentery (amebic)	14		Relapsing fever	1	
Dysentery (bacillary)	3	1	Scarlet fever	1	
Leprosy		4	Tuberculosis		33
Malaria	121	7	Typhoid fever	4	2
Measles	66		Whooping cough	1	

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Hygiene, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; D, deaths; P, present]

Place		July 21-Aug. 20, 1932	Aug. 21-Sept. 17, 1932	Sept. 18-Oct. 15, 1932	Week ended— October, 1932		November, 1932				December, 1932					January, 1933				February, 1933	
					22	29	5	12	19	26	3	10	17	24	31	7	14	21	28	4	11
Baluchistan	C	39	1																		
	D	37	2																		
China:																					
Amoy	C	456	260	34									6								
	D	212	40	12																	
Canton	C	32	22	17								1									
Hankow	C	334	229	4																	
Hong Kong	C	68	25	2																	
Kwantung Leased Territory—District of Port Arthur	C	2		1																	
Macao	C	93	9	1																	
	D	92	9	1																	
Nanking	C	763	255	12																	
Shanghai	C	1,045	546	35																	
Swatow	C	238	33	30		3															
Tientsin	C	69	32	1																	
Tsinan—Shantung Province	C		P																		
Tsingtao	C	10	36	6																	
Chosen	C		17																		
India	C	6,270	6,312	3,626	785	482	543	661	648	711	1,045	1,049	1,094								
	D	2,423	3,477	2,072	453	289	268	326	404	326	592	585	551								
Bombay	C	2			3	1		1										1			
Calcutta	C	158	82	62	6	11	24	28	15	8	18	12	13	11	17	13	27	25			
Rangoon	C		1																		
India (French): Pondicherry Territory	C	3																			
Indo-China (see also table below):																					
Pnom-Penh	C	1	1	5											1						
Saigon and Cholon	C		1	1	1																
Japan: Osaka Prefecture	C	1																			

Philippine Islands:																					
Bulacan Province	C	3																			
	D	2																			
Cebu Province	C			1																	
Iloilo Province	C		1	16																	
	D		1	11																	
Iloilo	C	1																			
	D	1																			
Leyte Province	C		43	4							6	1	6	17	14	43	24		31	55	21
	D		18	2							6	1	2	14	5	23	11		20	15	14
Manila	C			1																	
Samar Province	C		54	48	15	8	30	0	0	35				7	68	60		121			
	D		34	38	15	5	22	0	0	26				4	54	43		75			
Siam	C	1			1										1				1		
Straits Settlements: Singapore	C			1																	
On vessels:																					
S. S. Shanghai Maru at Kobe from Shanghai	C	1																			
S. S. Protesilus at Hong Kong from Shanghai	C	P																			
S. S. Nikawa Maru at Hong Kong from Shanghai	C	P																			
S. S. Yusang at Hong Kong from Shanghai	C	1																			
S. S. Taisan Maru en route Tsingtao to Moji	C		1																		

Place		July, 1932	August, 1932	September, 1932			October, 1932			November, 1932			December, 1932		
				1-10	11-20	21-30	1-10	11-20	21-31	1-10	11-20	21-30	1-10	11-20	21-31
Indo-China (French) (see also table above):															
Annam [1]	C	8													
	D	4													
Cambodia [1]	C	15	10		4	2	3	1		1			1	1	
	D	16	5		2	2	3			1			1		
Cochin-China [1]	C	31	11	8	8	2	4	3	3				2	3	3
	D	27	8	7	7	2	4	1	2				2	3	1

[1] Reports incomplete.

CHOLERA, PLAGUE, SM LPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE[1]

[C indicates cases; D, deaths; P, present]

Place		July 24–Aug. 20, 1932	Aug. 21–Sept. 17, 1932	Sept. 18–Oct. 15, 1932	Week ended— October, 1932: 22	29	November, 1932: 5	12	19	26	December, 1932: 3	10	17	24	31	January, 1933: 7	14	21	28	Feb. 4 1933
Angola: Naulila	C									P										
Argentina:																				
Chaco—Villa Angela	C		6																	
Cordoba Province	C												2							
La Rioga Province	D							4												
Salta Province	C						7				12									
San Luis Province[2]	C	1										P								
Santa Fe	C														1					
Belgian Congo	C												1							
British East Africa (see also table below):																				
Tanganyika	D			10					1											
Uganda	C	62	100	95	39	32	45	76	52	46	50	46	34							
	D	56	98	91	35	32	44	75	52	24	48	45	34							
Ceylon: Colombo	C	1	5	5	2	4	1	2	2	1	3	5	1	2		1	3	1		
	D		5	4	2	4	1	1	2	2	2	1	1	2			2			
Plague-infected rats		2	1	3	1	3	1							2		2				
Chile: Antofagasta—Plague-infected rats		3		1																
Dutch East Indies:																				
Surabaya	C	1	1																	
West Java	C	154	259	418	130	110	105	157	159	117	154	230	208	297						
	D	151	258	403	128	112	105	157	139	116	153	200	206	293						
Ecuador. (See table below.)																				
Egypt:																				
Alexandria	C	6	1	4									1			1	1			
Assiout	C	1												1	3	2	1	2		
Beheira	C	1	2	2																
Beni Suef	C		1																	
Gharbieh	C			2																
Minieh	C		2	4			1													
France: Marseille	C														1					
Great Britain: Liverpool—Plague-infected rats				1																

Hawaii Territory:																				
Hawaii Island—Hamakua—Kukaiau	C																			
	D																			1
Plague-infected rats																2	1	1	4	
Paavillo—Plague-infected rats									1				8	1	2					
Maui Island—Makawao	C	1	1																	
Plague-infected rats		2	2	1																
Omaopio—Plague-infected rats																			1	
India	C	2,545	3,775	6,028	1,464	903	1,779	1,276	1,356	1,811	1,509	1,428	1,958							
	D	1,452	2,208	3,451	789	530	966	778	813	938	825	431	1,224							
Bassein	C	4	1	1			1													1
Plague-infected rats		1		1			1					1	1							
Bombay	C		4	1	3															
Plague-infected rats		32	27	30	9	10	11	4	3	5	2	5	1	7	6	2	5			
Madras	C	5																		
Madras Presidency	C	247	315	343	73	61	65	67	94	174	114	164	102	115						
	D	122	110	153	17	26	21	28	32	50	47	63	48	69						
Rangoon	C	3	3				1	1	1	1	1				1					1
Plague-infected rats		5		2													1			
Indo-China. (See table below.)																				
Iraq: Baghdad	C	3	1	1		1	2			1										
Madagascar. (See table below.)																				
Morocco	C	1								10			2		8	6				
Peru. (See table below.)																				
Senegal. (See table below.)																				
Siam	C	1	6	1	4	1	2		1	5	3				2	10				
South-West Africa.[4]																				
Syria: Beirut	C	2	4	4	1	4	2	2	5	6	1									
Union of South Africa: Orange Free State	C		1	P				P	P				P	P	P					
United States: California—San Benito County—Plague-infected ground squirrels		2															1			
On vessels:																				
S. S. City of Oxford at Liverpool from Alexandria—Plague-infected rats			1																	
S. S. Figuig at Marseille from Bona and Phillippeville	C		1																	
S. S. Patris at Beirut	C							3												

[1] Including plague in the United States and its possessions.
[2] Several cases of plague with 1 death were reported at Quines, San Luis Province, Argentina, on Dec. 9, 1932.
[3] At dock where steamship City of London was berthed.
[4] 227 cases of plague with 53 deaths were reported in Ovamboland, South-West Africa, up to Dec. 17, 1932. Antiplague measures have been taken.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

[C indicates cases; D, deaths; P, present]

Place		July, 1932	August, 1932	September, 1932	October, 1932	November, 1932	December, 1932	January, 1933
British East Africa (see also table above):								
Kenya	C	63	30	15	7	5	5	
Ecuador: Province—								
Loja	C	4		4				
Indo-China	C	2	2		1	2	3	4
	D	2	2		1	2	3	2
Madagascar:								
Province—								
Ambositra	C	20	9	30	35	41		
	D	20	5	28	34	25		
Antisirabe	C	31	45	42	73	25		
	D	30	45	41	73	25		
Maevatanana	C	1	1			8		
Miarinarivo	C	10	5	8	19	35		
	D	9	5	8	19	34		
Moramanga	C	15	4	52	225	229		
	D	15	4	49	208	223		
Tamatave	C	2	2		1	1	1	
	D	1	2		1	1	1	
Tananarive	C	24	35	75	178	209		
	D	24	35	75	173	199		

Place		July, 1932	August, 1932	September, 1932	October, 1932	November, 1932	December, 1932	January, 1933
Peru: Department—								
Ancachs	C					2		
Lambayeque	C		1					
Libertad	C				1	2		
Lima	C	1		2	5	5		
Piura	C					P		
Senegal:								
Dakar [6]	C	10	37	7	2	6	19	
	D	9	28	7	2	4	17	
Louga [6]	C	1	1	2	9			
	D	3	1	2	6			
Rufisque [6]	C	28	23	8				
	D	27	21	5				
Thies [6]	C	16	5	15				
	D	13		11				
Tivaouane [6]	C			6				
	D			7				

SMALLPOX

Place		July 24–Aug. 20, 1932	Aug. 21–Sept. 17, 1932	Sept. 18–Oct. 15, 1932	Week ended— October, 1932		November, 1932				December, 1932					January, 1933				Feb. 4, 1933
					22	29	5	12	19	26	3	10	17	24	31	7	14	21	28	
Algeria:																				
Algiers	C		1	1	1			1	1					1						
Southern Territories	C	2																		
Arabia: Aden	C				1				1	2			1							
Argentina:																				
Formosa Province	C		P																	
Jujuy Province	C					1														
Belgian Congo	C	130	288								51	71	88							
Belgium	C							1												
Bolivia: Potosi	C														5					
Brazil:																				
Parahyba—Joao Pessoa	C										P									
Pernambuco—Recife	C										P									
Porto Alegre (alastrim)	C	10	14	41	13	9	4			5	2	1	2	9						
British East Africa: Tanganyika	C	163	95	65	10	56	3	5	14	23	27	2	9							
British South Africa:																				
Northern Rhodesia	C	1					40								3					
Southern Rhodesia	C			1			26	1		1			1							
Canada:																				
Alberta	C									1										
Manitoba	C	1			1			1												
Ontario	C	3	3									5	10			3				
Toronto	C											3	3							
Saskatchewan	C		1	6							1	2		1					3	
Ceylon: Colombo	C										23	5	23	3	27	19	14	22	12	27
China:																				
Canton	C	4	1	2	6	4	5	13	14	15	79	72	130	213	198	221	189	151	101	63
	D		1		1		1		1	1	9	3	3	8	6	6	4		7	2
Foochow	C	P	P	P			P	P		P			P			P				
Hong Kong	C	2	P								1	1		3	5	10	10	22	14	32
Macao	C														P		1		1	1
Nanking	C			2							6				11		13			
Shanghai	C				1			4	1	7	4	1	4	5	4	10	14	6	12	9
Swatow	C			1				4	2		1	5		2		5		10		
Chosen. (See table below.)																				
Colombia: Cali	D	2									1									

[4] Suspicious cases. [6] Reports incomplete.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths; P, present]

Place		July 24–Aug. 20, 1932	Aug. 21–Sept. 17, 1932	Sept. 18–Oct. 15, 1932	Week ended— October, 1932		November, 1932				December, 1932					January, 1933				Feb. 4, 1933
					22	29	5	12	19	26	3	10	17	24	31	7	14	21	28	
Dahomey	C		6	2	6										5		7			
Dutch East Indies	C	1	1	1	1	1														1
Egypt:																				
Alexandria	C	9	12	17	7	5	5	6	8	15	12	42	79	131	154	219	237	241	162	227
	D	4	4	9	4	2	4	3	1	5	2	9	14	22	47	33	40	52	59	70
Cairo	C								1				1		2	5	4	11	14	
Gharbieh	C														13	24				
Port Said	C																	1		1
Suez	C																	1	1	
Finland	C	1																		
Great Britain:																				
England and Wales	C	76	51	59	38	34	21	23	16	14	27	15	28	16	19	16	18	16		
London	C	48	17	56		27	28	21	15	13	25	15	26	16	17	14	17	14		
London and Great Towns	C	67	38	33	33	34	21	22	16	14	26	15	27	16	18	15	18	16		
Greece. (See table below.)																				
Honduras:																				
Puerto Castilla	C			1					1											
Tegucigalpa	D		1																	
Tela	C		1	2			2			1				1		1		1	3	
India	C	5,722	3,955	3,234	915	947	1,133	1,184	1,708	1,606	2,057	2,570	2,616							
	D	1,534	1,035	722	201	217	307	288	425	448	614	752	754							
Bassein	C	1																		
Bombay	C	42	32	27	7	6	8	12	10	14	29	43	58	44	54	71	93	159		
	D	17	21	20	3	4	5	3	3	4	10	18	3	20	29	46	44	55		
Calcutta	C	29	23	22	6	25	9	10	19	14	26	44	59	70	91	81	119	239		
	D	29	8	12	5	8	6	5	8	5	16	18	40	36	80	57	67	200		
Cochin	C						1													
Karachi	C	2	2	1						4	1	9	9	2	2	12	6	17		
Madras	C	47	51	89	24	33	45	35	24	26	36	33	75	33	24	41	55	47		
Moulmein	C	1	3																	
Negapatam	C			2	1	1	1		2	2						2		2		
Rangoon	C	5		1	1		1	1	1		1		2		1		2			
Tuticorin	C		7	19	9			3	8		5									
Vizagapatam	C															1				

India (French): Pondicherry Territory	C	16	13	13					2		1									
Indo-China (see also table below): Saigon and Cholon	C	8	4	2				1					1		1					
Iraq:																				
Baghdad	C	4	6	6	3	2	2	3	14	12	4	1	6	4	1	2	2	2	3	
Basra	C		6	33	18	17	21	29	27	22	19	13	11	4	6	4	1	1	1	3
Mexico:																				
Chihuahua	D	3																		
Mexico, D. F.	C	12	9	4	1		2	1	1	1							2			
Monterrey	C							1												
Saltillo	D	3	2		1			2	2	4	1	4	4	1	1	2	4			
San Luis Potosi	D					1		2												
Torreon	C			5		1														
Morocco. (See table below.)																				
Nigeria	C	402	83	58	1	57			1,258			293		489						
Persia	C		99	189	104	86	104	110	89	90	67	95	64	52	53	47	23			
	D		43	94	39	55	35	37	36	41	32	41	25	24	15	18	14			
Peru. (See table below.)																				
Poland	C	1											1							
Portugal:																				
Lisbon	C	16	9	9		4		1	1	3	1	4	7	3		2		1	1	
Oporto	C	23	18	5			1		1	2	4	4		3	4	2		1		
Siam: Bangkok	D																			1
Sierra Leone[1]	C	6	16							3		10				10				
Straits Settlements	C		2																	
Sudan (Anglo-Egyptian)	C		1		5					5								13		41
Syria. (See table below.)																				
Turkey. (See table below.)																				
Union of Socialist Soviet Republics. (See table below.)																				
Union of South Africa:																				
Cape Province	C			P	P	P		P	P	P	P	P	P	P						
Orange Free State	C		P	P		P	P				P									
Transvaal	C									P		P	P							
Upper Volta	C	1																		
On vessels:																				
S. S. Amassis at Alexandria	C																1			
S. S. British Engineer at Marseille	C											1								
S. S. Somersetshire at Suez	C																	1		
S. S. British Splendour en route to Gibraltar	C								1											
S. S. Jervis Bay en route to Southampton	C								1											
	D								1											
S. S. Star of Alexandria at Alexandria	C													1						
S. S. Kohistan at Aden from Basra	C								1											

[1] From Mar. 6 to July 9, 1932, 878 cases of smallpox, with 13 deaths, were reported in Sierra Leone.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths; P, present]

Place		August, 1932	September, 1932	October, 1932 1-10	October, 1932 11-20	October, 1932 21-31	November, 1932 1-10	November, 1932 11-20	November, 1932 21-30	December, 1932 1-10	December, 1932 11-20	December, 1932 21-31	January, 1933 1-10	January, 1933 11-20	January, 1933 21-31
Indo-China (see also table above)	C	147	127	52	76	29	50	73	57	38	68	107			
	D	61	62	15	21	10	19	13	19	15	11	19			
Syria: Beirut	C	1					4	17	20	4	28	17	5	10	19

Place		July, 1932	August, 1932	September, 1932	October, 1932	November, 1932	December, 1932
Chosen	C	9	5				
	D	7	3				
Greece	C	2					
Morocco	C	11	19	24	33	53	81
Peru	C		25	166	75	67	
Turkey (see also table above)	C	3	20	13	13		
	D		3	4	1		
Union of Socialist Soviet Republics	C	967	538				

TYPHUS FEVER

Place		June 26–July 23, 1932	July 24–Aug. 20, 1932	Aug. 21–Sept. 17, 1932	Sept. 18–Oct. 15, 1932	Week ended— October, 1932 22	October, 1932 29	November, 1932 5	November, 1932 12	November, 1932 19	November, 1932 26	December, 1932 3	December, 1932 10	December, 1932 17	December, 1932 24	December, 1932 31	January, 1933 7	January, 1933 14	January, 1933 21	January, 1933 28
Algeria:																				
Algiers	C	53	10	34	11															
Bone	C				2		1	5	1		2								1	
Constantine Department	C	102	26											1					1	
Argentina: Buenos Aires	C			1							2		1					1		
Bolivia (see table below).																				
British East Africa: Uganda	C				16	18		1		4			12							

[illegible]	C	10	4	1								2	10	6						
Chile (see also table below):																				
Antofagasta	C						1													
Iquique	C	1																		
Santiago	C	15		22	61	11	7	6	17	4		90	72	45	48					
Talcahuano	D		1																	
China: Hankow	C	1																		
Chosen. (See table below.)																				
Colombia: Cali	D				1					1										
Czechoslovakia. (See table below.)																				
Egypt:																				
Alexandria	C		1	5													1	1		
Beheira	C		15		21							2								
Gharbieh	C			1	1															
Port Said	C	3	3	1	1			1		1										
Provinces	C	122	43	6	3											33	26			
Greece. (See table below.)																				
Guatemala. (See table below.)																				
Irish Free State:																				
Cork County—																				
Bandon	C				1															
Schull	C		1																	
Dublin	C				2															
Kerry County—																				
Dingle	C			1																
Killarney district	C								1		16			2	5					
Lithuania. (See table below.)																				
Mexico:																				
Mexico, D. F.	C	11	4	10	3	2	1	6	2	6	1	2	1	2	1					
Monterrey	C		1																	
Torreon	C	1		6						1	1									
Morocco	C	6	8	7	2					2	4	7	9	17	1	9	16	10	9	
Palestine	C	1		6	5		1	1			1	1				1		1		
Persia	C	54	7	6	16				2	1	6		4	3	4	2	7	3		
Peru. (See table below.)																				
Poland	C	101	29	26	120	21	15	7	20	13	14	17	21	32	11	55	54	40	63	
	D	5	2	2	9	7	3	1	2	2	1	2	1	1		3	1	6	9	
Portugal: Oporto	C				1															
Rumania	C	55	20	17	9	1	6			22	17	26	33	66	66	43				
Tunisia: Tunis	C	8	6										1		9			4	6	25
Turkey (see also table below): Istanbul	C	1	4	1	1				2					1		1				
Union of Socialist Soviet Republics. (See table below.)																				
Union of South Africa:																				
Cape Province	C	P	P	P	P	P	P	P	P	P	P		P	P	P	P				
Natal	C	1			P	P	P	P		P	P		P	P	P	P				
Orange Free State	C	P	P	P	P	P	P	P	P		P		P	P	P	P				
Transvaal	C	P									P					P				
Yugoslavia. (See table below.)																				
On vessels: S. S. Munplace at New Orleans from Progresso	C																			1

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER—Continued

[C indicates cases; D, deaths; P, present]

Place		July, 1932	August, 1932	September, 1932	October, 1932	November, 1932	December, 1932	January, 1933
Bolivia	C						4	
Chile: Coquimbo Province	C					60		
Greece	C	3	14	15	4		7	
Guatemala	C		2	9			3	
Lithuania	C	7		5		1	10	22
Peru	C		37	50	81	75	111	
Turkey	C	7	8	6	11	15		
Union of Socialist Soviet Republics	C	6,054	2,065					
Yugoslavia	C		1			3	11	

YELLOW FEVER

Place		July 24–Aug. 20, 1932	Aug. 21–Sept. 17, 1932	Sept. 18–Oct. 15, 1932	Week ended— October, 1932: 22	Oct. 29	November, 1932: 5	Nov. 12	Nov. 19	Nov. 26	December, 1932: 3	Dec. 10	Dec. 17	Dec. 24	Dec. 31	January, 1933: 7	Jan. 14
Brazil:																	
Ceara State	C		1	1			1					1					
	D	3	1	1													
Parahyba State	D		2	1													
Pernambuco State	D	1	3	1													
French West Africa: Guinea	C							2	1	2		1					
	D							2	1	2		1					
Guinea (Portuguese): Bissagos Islands	C																43
	D																13
Senegal	C				8												
	D				5												
Bakel—Kidira	C			6													
	D			5													
Upper Gambia	C			3													
	D			2													
Sudan (French): Keyes	C						3	1		1	1						
	D						3	1		1	1						

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HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst. Surg. Gen. R. C. WILLIAMS, *Chief of Division*

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PUBLIC HEALTH REPORTS

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SEASONAL VARIATION OF AVERAGE GROWTH IN WEIGHT OF ELEMENTARY SCHOOL CHILDREN [1]

By CARROLL E. PALMER, M. D., *Consultant in Child Hygiene, United States Public Health Service* [2]

In 1921, the United States Public Health Service, assisting in a health demonstration project at Hagerstown, Md., began an investigation of certain general problems connected with the physical growth of elementary school children. The results of various parts of the growth study will be published in a series of papers, of which this, the first of the series, will be limited to a consideration of the variations of growth in weight occurring coincident with changes of season. Information concerning the organization, methods, and other details of the health demonstration project will be found in recent volumes of the Public Health Reports. Attention is particularly directed, however, to two papers by Sydenstricker (1) and (2), which give detailed information relevant to the present study with regard to the social, economic, geographic, and demographic characteristics of the city of Hagerstown.

The basic material for the study consists of monthly weighings of approximately 2,500 native-born white children whose ages ranged from 6 to 16 years. This group represents the children enrolled in the eight elementary schools of the city. Weighings of the children were begun late in September and were repeated at approximately monthly intervals until late in May for each of the school years from (September) 1923 until (May) 1928.

The general plan for the selection of the children was as follows: During the first school year, 1923-24, the children in the first through the fourth grades attending the eight schools were weighed. The

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[1] From the Office of Field Investigations in Child Hygiene, U. S. Public Health Service, in cooperation with the department of biostatistics (Paper No. 179) of the School of Hygiene and Public Health, The Johns Hopkins University.

[2] The investigation during which the data used in this paper were collected was begun under the direction of Asst. Surg. Gen. Taliaferro Clark, formerly officer in charge of field investigations in child hygiene. The field observations were made under the immediate supervision of Passed Asst. Surg. R. B. Norment, Jr. The writer is indebted to these officers of the U. S. Public Health Service and to Acting Asst. Surg. E. Blanche Sterling, Senior Statistician S. D Collins, Asst. Statistician Amanda Stoughton, and Miss Katherine Schindel, field worker, for assistance in the interpretation of the data. Grateful acknowledgment is made to Prof. L. J. Reed of The Johns Hopkins University for specific suggestions and criticism received during the preparation of the paper.

next year, 1924–25, the children in the second through the fifth grades attending the schools were weighed, and similarly, in each successive year, one lower grade was eliminated and one higher grade added. It was impossible to follow all of the children for the entire period, and an arbitrary decision was made to include in the present analysis records of only those children who presented at least 80 per cent complete protocols over a 4-year period. In the group of children studied, therefore, the selective factors were those differential elements which maintain or disturb the constancy of school populations throughout the elementary grades and the arbitrary factors introduced by dropping children not presenting fairly complete records for four out of five years.

The actual weighings of the children were made by one individual. Weights were taken in pounds to the nearest quarter pound. All weighings were made without shoes, vests, sweaters, or coats, but included the regular indoor clothing. It was not feasible to obtain nude weights, but, as will be seen later, some indirect evidence can be adduced to the effect that errors introduced by seasonal differences in clothing weights probably do not affect the major conclusions of the study. The day of weighing varied slightly from month to month and from year to year, and the time of day for successive weighings was not held rigorously constant. Certain corrections will be made for differences in number of days elapsing between monthly weighings, but no corrective account can be taken of the differences in time of day. In general, individual grades and individual children in each grade were weighed in the same order on the different weighing days; and, although considerable variability must be effected by lack of rigorous control of this factor, it is believed that, to a large extent, deviations will occur at random and will not greatly influence the general results of the study.

Since 1920 a great many papers have appeared which deal with seasonal and short-time cyclic manifestations of physical growth processes. It is of interest that the classical work of Malling-Hansen (3) has been reviewed no less than eight times during the past 12 years. The recent excellent monograph by Nylin (4) contains a comprehensive and unbiased review of the literature and a bibliography of 259 relevant titles. It will be considered sufficient in this report to refer to Nylin's paper, to state very briefly his conclusions, and to note the work which has appeared since his publication.

The consensus of informed opinion upon the question of seasonal variation of growth in weight affirms that growth proceeds at maximal rates during the late summer and autumn, continues at considerably reduced rates during the winter, and falls to minimal rates in the spring and early summer. This typical fluctuation has been observed in Danish children in Copenhagen, in Swedish children in Stockholm,

in Scotch children in Aberdeen, in German children in Berlin, and in American children in Boston and New York. It is of interest to note, also, that growth in weight is accelerated in the fall (April, May, and June) and greatly reduced in the spring (October, November, and December) in children of English stock in Melbourne. This latter observation, which was reported by Fitt (5) in an infrequently quoted but important paper, furnishes evidence that the cyclic manifestation of physiologic activity is associated in some as yet unexplained manner with seasonal changes.

Working over the earlier data of Woodbury, by rigorous statistical methods Berkson (6) has adduced definitive evidence for a typical seasonal change of growth rates. Later, Orr and Clark (7) showed that the most rapid growth of weight occurs (in the Northern Hemisphere) during September, October, and November, and that the smallest increments are added during the spring and summer.

The observational data available for the present study were reduced by common statistical methods, and are presented in Tables 1 and 2. The methods of collecting these data over a period of years, on children of different ages, would permit an analysis of the growth of children of given age for different calendar years, but in this report it was decided to accumulate records of children of given age unspecified with respect to the year of measurement. This procedure was justified on the grounds that although convincing evidence (Martin (8), Hansen (9), Mumford (10), Paterson and Marsden (11), Jackson (12), and Wolff (13)) has accumulated which shows or suggests differences in growth in different calendar years, the seasonal trends, as previously reported, are of such size as quite completely to dominate any change in growth rates which may be expected to occur in successive calendar years.

TABLE 1.—*Constants* [1] *of frequency distributions of weight in October of a selected group of elementary school children, Hagerstown, Md., 1923–1927*

BOYS

Age group	6	7	8	9	10	11	12	13	14	15
Mean age Jan. 1 (years)	6.22	7.04	8.02	9.00	9.99	10.98	11.96	12.95	13.93	14.90
Number of children	238	597	840	978	993	869	681	403	256	91
Mean weight in October (pounds)	44.19	47.85	52.90	57.98	63.55	69.76	76.01	83.84	93.77	98.99
σ October weight (pounds)	4.75	5.77	7.00	7.76	9.60	11.30	13.20	15.80	19.12	18.08
β_1	0.0284	0.6023	0.9831	0.8757	2.1410	2.3731	2.0576	1.8809	0.9963	0.0401
β_2	2.8200	5.7969	5.7335	5.5789	8.8552	8.0339	7.2373	5.7732	4.4465	2.3166

GIRLS

Age group	6	7	8	9	10	11	12	13	14	15
Mean age Jan. 1 (years)	6.24	7.06	8.04	9.03	10.01	11.00	11.98	12.96	13.92	14.84
Number of children	237	573	811	921	925	798	614	415	220	67
Mean weight in October (pounds)	43.29	46.48	51.28	56.27	62.20	69.11	78.00	87.12	97.36	106.32
σ October weight (pounds)	5.10	5.59	6.66	8.16	9.99	12.54	15.48	16.82	18.20	19.80
β_1	1.0317	1.0547	1.2065	2.0722	2.5166	1.8560	1.4181	0.5714	0.5644	0.7470
β_2	6.0022	6.1411	6.1569	7.1693	7.9461	5.9464	5.7458	4.2627	4.8202	4.5420

[1] These constants furnish the data for a complete description of the distributions according to the Pearsonian system of frequency curves. The present paper only briefly mentions certain of the variability constants tabulated. A subsequent paper will consider the latter data in more detail.

Also, the increase in number of cases per year of age greatly stabilizes the statistical constants and materially smooths out the fluctuations due to random sampling. Tabulations were made, therefore, to show entries for each child for each year that he contributed to the study. Thus, if a child of 6 in 1923–24 was measured during each year of the study, he appears in the record of 6-year-old children (1923–24), in the record of 7-year-old children (1924–25), in the record of 8-year-old children (1925–26), and so on.

The children were grouped into age classes by single years of life, age being taken as of the birthday nearest to January 1. Under the headings of mean age in Table 1, the arithmetic average age of the children in each age class is shown. Although many recent writers fail to make such calculations, assuming the mean age to center at the midpoint of the class intervals, the necessity for taking account of this variable has been demonstrated by Boas (14), Schiotz (15), and others. Boas' data showed that the differences between mean ages of yearly classes were uniformly less than full years, and that the actual difference between the 5½ and 15½ year old classes was approximately 9.8 years rather than 10 years. The data presented in this report show a difference of approximately 8.6 years between the 6 and 15 year old classes. The latter difference, although small, is representative of approximately 3 pounds in weight, and obviously, if anthropological studies are to attain a high standard of accuracy, corrections for such differences must be made. The errors which inevitably seem to appear in statements of age of school children were reduced by requiring the actual date of birth to be recorded on each yearly protocol. Because at least four records were obtained for each child, age was verified with reasonable accuracy.

General features of the growth of this group of school children were determined by an analysis of the distributions, for each age class, of actual weights on the October weighing days. Table 1 shows, therefore, the mean, the standard deviation (σ), and the third and fourth moment constants (β_1 and β_2 in Pearson's notation) for the distributions of weight in October for each age group. For children of ages approximately 6, 7, and 8 years, weight was grouped in 2-pound intervals; for children of ages 9, 10, and 11 years, weight was grouped in 3-pound intervals; and for children from 12 through 16 years, weight was grouped in 4-pound intervals. Sheppard's corrections for the effect of grouping were not applied.

TABLE 2.—*Constants*[1] *of frequency distributions of weight increments, for given incremental periods, of a selected group of elementary school children, Hagerstown, Md., 1923–1927*

Males, 6-year age group; average age Jan. 1, 6.22 years

Number of cases	122	158	160	159	158	156	157	150	144
Incremental period	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Summer
Average number days, incremental period	28.0	28.6	26.0	34.3	31.0	32.7	27.6	29.7	130.6
Midday, incremental period	(Oct.) 5.5	(Nov.) 2.8	(Dec.) 0.1	(Dec.) 30.2	(Feb.) 0.9	(Mar.) 4.7	(Apr.) 3.3	(May) 1.9	(July) 21.2
Mean gain (pounds)	0.80	0.76	0.15	0.32	0.44	0.55	0.27	0.11	1.13
σ (pounds)	0.82	0.85	0.93	0.99	0.91	0.88	0.77	0.79	
β_1	0.0279	0.0708	0.7205	0.8370	0.1303	0.0083	0.0005	0.0171	
β_2	4.1723	3.8553	6.1015	6.2774	3.7031	3.3472	3.1215	3.0757	

Females, 6-year age group; average age Jan. 1, 6.24 years

Number of cases	113	158	165	162	163	163	159	146	145
Incremental period	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Summer
Average number days, incremental period	27.9	28.5	26.1	34.2	30.9	32.9	27.7	29.6	130.2
Midday, incremental period	(Oct.) 5.8	(Nov.) 3.0	(Dec.) 0.3	(Dec.) 30.4	(Feb.) 0.9	(Mar.) 4.8	(Apr.) [illegible]	(May) 2.2	(July) 21.3
Mean gain (pounds)	0.90	0.77	0.16	0.30	0.45	0.33	[illegible]	0.13	1.04
σ (pounds)	0.87	0.84	0.91	0.96	0.97	0.90	0.9[illegible]	1.00	
β_1	0.0125	0.0299	1.0098	0.4817	0.1365	0.001[illegible]	0.2014	0.1597	
β_2	2.7474	2.6754	5.7196	4.9526	5.6337	3.4453	6.[illegible]	5.9722	

Males, 7-year age group; average age Jan. 1, 7.04 years

Number of cases	323	424	440	435	427	432	427	392	377
Incremental period	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Summer
Average number days, incremental period	28.1	28.2	26.1	33.7	30.8	32.7	28.2	29.3	130.1
Midday, incremental period	(Oct.) 6.3	(Nov.) 3.2	(Dec.) 0.3	(Dec.) 30.2	(Feb.) 0.4	(Mar.) 4.2	(Apr.) 3.2	(May) 1.9	(July) 21.0
Mean gain (pounds)	0.91	0.68	0.26	0.57	0.48	0.46	0.20	0.15	1.44
σ (pounds)	0.98	0.97	0.90	0.91	0.92	0.94	0.87	0.90	
β_1	0.0155	0.0062	0.1983	0.1685	0.0593	0.1229	0.5068	0.0000	
β_2	3.6708	4.5014	6.6352	3.5993	5.2284	4.5759	5.6526	4.7565	

Females, 7-year age group; average age Jan. 1, 7.0[illegible] years

Number of cases	318	422	437	435	432	426	418	396	375
Incremental period	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Summer
Average number days, incremental period	28.2	28.1	26.1	33.6	30.7	32.5	[illegible]	29.2	130.5
Midday, incremental period	(Oct.) 6.2	(Nov.) 3.2	(Dec.) 0.3	(Dec.) 30.1	(Feb.) 0.3	(Mar.) 3.9	(Apr.) 2.9	(May) 1.7	(July) 20.8
Mean gain (pounds)	0.98	0.78	0.30	0.42	0.41	0.56	0.17	0.05	1.49
σ (pounds)	1.04	0.91	0.92	0.98	0.96	0.91	0.87	0.85	
β_1	0.0410	0.0029	0.0026	0.1752	0.1406	0.0259	0.0280	0.0120	
β_2	5.7374	4.8669	3.8278	7.2700	6.9715	4.3062	3.7488	3.6965	

Males, 8-year age group; average age Jan. 1, 8.02 years

Number of cases	482	656	659	662	662	644	642	605	562
Incremental period	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Summer
Average number days, incremental period	28.4	27.9	26.2	33.1	30.7	31.8	29.1	29.0	131.2
Midday, incremental period	(Oct.) 6.8	(Nov.) 2.7	(Nov.) 29.7	(Dec.) 29.4	(Jan.) 30.2	(Mar.) 2.4	(Apr.) 1.6	(May) 0.6	(July) 20.2
Mean gain (pounds)	0.98	0.85	0.33	0.61	0.51	0.52	0.40	−0.00	1.52
σ (pounds)	0.99	1.00	0.94	1.01	1.01	1.04	0.94	0.98	
β_1	0.0659	0.0223	0.0286	0.0027	0.0528	0.0422	0.0512	0.0063	
β_2	3.5469	4.1921	4.2068	4.1862	5.8575	5.3645	4.0788	3.9287	

Females, 8-year age group; average age Jan. 1, 8.04 years

Number of cases	442	633	639	641	636	626	621	599	555
Incremental period	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Summer
Average number days, incremental period	28.2	28.0	26.2	33.3	30.7	31.7	29.1	29.0	131.3
Midday, incremental period	(Oct.) 6.7	(Nov.) 2.4	(Nov.) 29.5	(Dec.) 29.2	(Jan.) 30.2	(Mar.) 2.4	(Apr.) 1.5	(May) 0.5	(July) 20.1
Mean gain (pounds)	0.90	0.81	0.41	0.56	0.41	0.41	0.29	0.01	1.82
σ (pounds)	0.96	1.06	0.93	1.02	0.94	1.00	1.00	1.07	
β_1	0.0131	0.1365	0.0000	0.3071	0.0000	0.0367	0.2342	0.0012	
β_2	5.8356	4.5404	3.8374	5.3727	4.1701	4.0903	6.8680	4.9673	

[1] These constants furnish the data for a complete description of the distributions according to the Pearsonian system of frequency curves. The present paper only briefly mentions certain of the variability constants tabulated. A subsequent paper will consider the latter data in more detail.

TABLE 2.—*Constants of frequency distributions of weight increments, for given incremental periods, of a selected group of elementary school children, Hagerstown, Md., 1923–1927*—Continued

Males, 9-year age group; average age Jan. 1, 9 years

Number of cases	500	853	869	880	878	872	880	802	671
Incremental period	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Summer
Average number days, incremental period	28.5	27.8	26.6	33.1	30.7	30.8	29.8	28.8	132.1
Midday, incremental period	(Oct.) 6.9	(Nov.) 0 9	(Nov.) 28.1	(Dec.) 27.9	(Jan.) 28.9	(Mar.) 0 6	(Mar.) 30.6	(Apr.) 28.9	(July) 19.6
Mean gain (pounds)	1.08	0.99	0.49	0.64	0.55	0.58	0.27	0.08	1.79
σ (pounds)	1.16	1.11	1.03	1.15	1.04	1.05	1.02	1.12	----------
β_1	0.1256	0.0047	0.0599	0.1813	0.0144	0.1341	0.0343	0.0855	----------
β_2	4.9875	5.7962	4.5750	5.5922	4.1364	4.4630	4.1981	5.5201	----------

Females, 9-year age group; average age Jan. 1, 9.03 years

Number of cases	496	813	827	824	827	826	814	752	633
Incremental period	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Summer
Average number days, incremental period	28.6	27.8	26.7	33.1	30.7	30.7	29.9	28.8	132.3
Midday, incremental period	(Oct.) 6.8	(Nov.) 0.8	(Nov.) 28.0	(Dec.) 27.9	(Jan.) 28.7	(Mar.) 0 4	(Mar.) 30.4	(Apr.) 28.7	(July) 19.5
Mean gain (pounds)	1.04	0.94	0.45	0.64	0.42	0.52	0.25	0.04	2.19
σ (pounds)	1.03	1.02	1.07	1.20	1.11	1.03	1.01	1.01	----------
β_1	0.0029	0.0573	0.0355	0.0602	0.0031	0.0481	0.1458	0.0810	----------
β_2	3.9231	4.0583	4.6863	4.6547	4.9377	4.4958	4.7739	4.0404	----------

Males, 10-year age group; average age Jan. 1, 9.99 years

Number of cases	452	921	939	947	945	940	931	883	652
Incremental period	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Summer
Average number days, incremental period	28.6	27.6	27.1	33.1	30.7	30.1	30.4	28.7	132.7
Midday, incremental period	(Oct.) 7.0	(Oct.) 30.5	(Nov.) 26.8	(Dec.) 26.9	(Jan.) 27.8	(Feb.) 27.2	(Mar.) 29.1	(Apr.) 27.7	(July) 19.2
Mean gain (pounds)	1.17	1.02	0.49	0.73	0.64	0.53	0.31	−0.01	2.06
σ (pounds)	1.19	1.15	1.13	1.17	1.15	1.16	1.11	1.13	----------
β_1	0.1071	0.0754	0.0019	0.0479	0.1481	0.0151	0.0463	0.0508	----------
β_2	4.7892	4.5949	3.5962	3.8755	5.3001	5.4528	5.0670	3.9125	----------

Females, 10-year age group; average age Jan. 1, 10.01 years

Number of cases	452	884	894	892	888	883	870	816	633
Incremental period	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Summer
Average number days, incremental period	28.5	27.7	27.1	33.1	30.7	30.2	30.3	28.7	132.7
Midday, incremental period	(Oct.) 7.0	(Oct.) 30.6	(Nov.) 25.9	(Dec.) 27.0	(Jan.) 27.9	(Feb.) 27.4	(Mar.) 29.3	(Apr.) 27.8	(July) 19.2
Mean gain (pounds)	1.09	0.90	0.62	0.86	0.39	0.60	0.40	0.10	2.84
σ (pounds)	1.26	1.15	1.14	1.30	1.09	1.16	1.19	1.13	----------
β_1	0.0000	0.0030	0.0003	0.0885	0.0041	0.0133	0.0026	0.0052	----------
β_2	4.1705	4.5758	3.9521	4.5814	4.1578	4.4461	4.4403	3.5389	----------

Males, 11-year age group; average age Jan. 1, 10.98 years

Number of cases	347	825	841	857	859	851	833	775	538
Incremental period	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Summer
Average number days, incremental period	28.6	27.4	27.5	32.9	30.6	29.7	31.0	28.5	133.0
Midday, incremental period	(Oct.) 7.6	(Oct.) 29.6	(Nov.) 26.1	(Dec.) 26.3	(Jan.) 27.1	(Feb.) 26.2	(Mar.) 28.2	(Apr.) 26.9	(July) 18.7
Mean gain (pounds)	1.16	0.97	0.65	0.79	0.56	0.66	0.38	0.02	2.27
σ (pounds)	1.27	1.25	1.24	1.25	1.28	1.21	1.18	1.26	----------
β_1	0.0717	0.1459	0.0544	0.0788	0.0056	0.0435	0.0564	0.0000	----------
β_2	4.1711	4.7826	3.9705	4.7178	4.5634	4.2551	3.6950	5.0817	----------

Females, 11-year age group; average age Jan. 1, 11 years

Number of cases	320	780	788	794	794	782	777	721	497
Incremental period	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Summer
Average number days, incremental period	28.6	27.4	27.5	33.0	30.6	29.7	30.9	28.5	132.8
Midday, incremental period	(Oct.) 7.6	(Oct.) 29.6	(Nov.) 26.0	(Dec.) 26.3	(Jan.) 27.1	(Feb.) 26.2	(Mar.) 28.2	(Apr.) 26.9	(July) 18.8
Mean gain (pounds)	1.16	0.98	0.75	1.06	0.59	0.53	0.54	0.26	3.99
σ (pounds)	1.22	1.23	1.34	1.43	1.30	1.21	1.26	1.31	----------
β_1	0.0371	0.2008	0.0663	0.1503	0.0860	0.0220	0.0559	0.0967	----------
β_2	4.5724	4.3198	3.8941	3.4475	5.1551	3.6950	4.4246	4.7680	----------

	Males, 12-year age group; average age Jan. 1, 11.96 years									Females, 12-year age group; average age Jan. 1, 11.98 years								
Number of cases	232	660	676	683	675	664	648	594	349	203	595	611	615	615	611	601	560	345
Incremental period	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Summer	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Summer
Average number days, incremental period	29.1 (Oct.)	27.3 (Oct.)	27.8 (Nov.)	32.9 (Dec.)	30.6 (Jan.)	28.9 (Feb.)	31.5 (Mar.)	28.3 (Apr.)	134.3 (July)	29.1 (Oct.)	27.3 (Oct.)	27.8 (Nov.)	32.9 (Dec.)	30.6 (Jan.)	28.9 (Feb.)	31.5 (Mar.)	28.4 (Apr.)	134.5 (July)
Midday, incremental period	7.7	28.4	24.9	25.3	26.0	24.8	26.6	25.5	18.1	7.8	28.4	24.9	25.2	26.0	24.7	25.6	25.5	18.9
Mean gain (pounds)	1.34	1.09	0.82	1.01	0.73	0.79	0.43	0.07	3.25	1.46	1.17	0.90	1.26	0.76	0.94	0.65	0.49	4.65
σ (pounds)	1.60	1.30	1.31	1.48	1.42	1.32	1.35	1.35	----------	1.45	1.37	1.48	1.48	1.41	1.42	1.46	1.49	----------
β_1	0.0230	0.1631	0.1853	0.2404	0.0188	0.0042	0.0045	0.0071	----------	0.0566	0.0139	0.0026	0.0211	0.0006	0.0147	0.0766	0.0098	----------
β_2	3.7418	4.0614	3.3960	3.8789	4.2879	3.9186	4.1435	4.0368	----------	4.1375	4.0191	3.9050	3.6995	3.6948	4.3271	4.0160	3.7527	----------

	Males, 13-year age group; average age Jan. 1, 12.95 years									Females, 13-year age group; average age Jan. 1, 12.96 years								
Number of cases	95	439	462	471	470	463	453	413	200	83	394	416	420	417	414	402	369	181
Incremental period	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Summer	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Summer
Average number days, incremental period	28.9 (Oct.)	27.2 (Oct.)	28.4 (Nov.)	33.2 (Dec.)	30.6 (Jan.)	28.4 (Feb.)	31.9 (Mar.)	28.3 (Apr.)	134.9 (July)	29.4 (Oct.)	27.2 (Oct.)	28.4 (Nov.)	33.1 (Dec.)	30.7 (Jan.)	28.1 (Feb.)	32.0 (Mar.)	28.3 (Apr.)	135.8 (July)
Midday, incremental period	8.1	26.7	23.5	24.3	25.2	23.7	25.4	24.4	17.6	8.0	26.4	23.2	23.9	24.8	23.2	24.8	24.0	17.1
Mean gain (pounds)	1.64	1.30	0.96	1.22	0.95	1.05	0.55	0.30	3.60	1.85	1.25	1.01	1.07	1.02	1.10	0.64	0.38	4.57
σ (pounds)	1.35	1.51	1.51	1.54	1.50	1.52	1.44	1.63	----------	1.36	1.52	1.42	1.62	1.51	1.49	1.47	1.54	----------
β_2	0.1996	0.0212	0.1636	0.0193	0.0286	0.0000	0.1019	0.0551	----------	0.0024	0.0021	0.0622	0.0028	0.0017	0.0154	0.0001	0.0761	----------
β_1	2.7793	3.6611	4.2548	3.7829	4.1325	3.8926	4.0935	3.4580	----------	3.1754	4.1306	3.9021	3.1850	4.4760	3.7986	3.5228	3.1149	----------

	Males, 14-year age group; average age Jan. 1, 13.93 years									Females, 14-year age group; average age Jan. 1, 13.92 years								
Number of cases	40	237	255	256	256	247	242	219	70	28	218	222	226	229	225	218	190	54
Incremental period	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Summer	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Summer
Average number days, incremental period	30.1 (Oct.)	26.7 (Oct.)	29.2 (Nov.)	33.0 (Dec.)	30.5 (Jan.)	28.0 (Feb.)	32.6 (Mar.)	28.1 (Apr.)	136.1 (July)	29.9 (Oct.)	26.8 (Oct.)	29.2 (Nov.)	33.2 (Dec.)	30.6 (Jan.)	27.8 (Feb.)	32.5 (Mar.)	28.1 (Apr.)	135.8 (July)
Midday, incremental period	8.0	25.4	22.4	23.4	24.2	22.4	24.1	23.4	17.0	8.5	25.0	22.0	23.2	24.0	22.2	23.8	23.2	17.1
Mean gain (pounds)	2.03	1.56	1.17	1.59	1.25	1.22	0.75	0.59	4.48	1.54	1.11	0.78	1.14	0.85	0.84	0.31	0.32	4.18
σ (pounds)	1.85	1.40	1.64	1.81	1.56	1.53	1.52	1.67	----------	1.59	1.74	1.60	1.68	1.64	1.42	1.66	1.60	----------
β_1	0.0023	0.2386	0.0175	0.0098	0.0115	0.0244	0.0496	0.0543	----------	0.8919	0.0081	0.0021	0.0245	0.0017	0.1164	0.0237	0.1399	----------
β_1	3.0622	3.6648	3.8177	3.2691	3.5893	4.0011	3.6208	4.0715	----------	3.4905	3.3546	3.6133	3.1217	3.4413	3.7755	3.4566	3.6017	----------

TABLE 2.—*Constants of frequency distributions of weight increments, for given incremental periods, of a selected group of elementary school children, Hagerstown, Md., 1923–1927*—Continued

	Males, 15-year age group: average age Jan. 1, 14.90 years									Females, 15-year age group, average age Jan 1, 14 84 years								
Number of cases	3	84	89	89	90	86	83	67	27	6	68	69	69	71	70	67	58	17
Incremental period	Oct	Nov	Dec	Jan	Feb	Mar.	Apr.	May	Summer	Oct	Nov.	Dec	Jan	Feb	Mar	Apr	May	Summer
Average number days, incremental period	29.4 (Oct.)	27.2 (Oct.)	28.9 (Nov.)	33.5 (Dec.)	30.8 (Jan.)	27.4 (Feb.)	32.3 (Mar.)	28.3 (Apr.)	138.8 (July)	30.5 (Oct.)	26.9 (Oct.)	29.4 (Nov.)	33.3 (Dec.)	30.6 (Jan.)	27.5 (Feb.)	32.7 (Mar.)	28.2 (Apr.)	137.9 (July)
Midday, incremental period	8.2	24.6	21.6	22.8	23.9	22.0	23.4	22.7	15.6	8.1	24.2	21.3	22.6	23.6	21.6	23.1	22.5	16.0
Mean gain (pounds)	1.33	1.78	1.46	1.45	1.25	1.47	0.52	0.26	3.61	1.38	0.82	0.65	0.97	0.57	0.95	0.12	0.22	4.08
σ (pounds)	1.59	0.57	1.66	2.08	1.68	1.66	1.62	1.69	----------	1.14	1.74	1.73	1.80	1.60	1.70	1.29	1.75	
β_1	0.2521	0.3764	0.4979	0.0157	0.1329	0.1267	0.1333	0.2229	----------	1.5736	0.1044	0.0679	0.0264	0.0484	0.3317	0.049[illegible]	0.1155	
β_2	1.5000	4.5901	4.4459	3.0326	3.3282	2.5109	3.5169	5.2736	----------	3.3182	2.9940	2.6768	3.9965	3.3456	3.5380	3.122	3.1642	

It was believed that the short-time variations of growth could be studied most efficiently by expressing changes of weights as monthly gains or increments. Table 2 shows, therefore, the mean, the standard deviation, and the third and fourth moment constants (β_1 and β_2) of distributions of monthly increments for each month from October to May and for distributions of summer increments calculated as the difference between the September weighing and the previous May weighing. Increments were grouped in quarter-pound classes for the analysis of the distributions. For the purposes of description, monthly increments were assigned to the month in which the second weighing was made. For example, the increment found by subtracting the weight of a child on December 18 from his weight on November 14 was designated the December increment. Increments were calculated by arithmetic interpolation in those cases where monthly weighings were, for any reason, not observed. If more than two monthly weighings were omitted, the increments were tabulated as unknown. No observations were discarded, although gains, as great as 10 pounds for single months, were occasionally encountered. Sheppard's corrections for the effect of grouping were not applied. It should be clearly understood that the means of these distributions, denoted in the table as *mean increments*, represent the *average gain in weight per child per time-interval.*

The variation in number of days between successive weighings makes it necessary to give, for each interval, the average number of days between weighings. These averages are the simple differences, in days, between successive arithmetic mean monthly weighing days. It is implicitly assumed by this method of correcting for differences in the number of days between weighings that growth over the period concerned may be represented by an arithmetic progression. The same assumption has been made by Boas (14), who gives a full algebraic formulation of the problem and justifies the assumption.

No variability constants accompany the average number of days per interval, as the frequency distributions of days are extremely skewed, and the use of any common measure of variability can not be readily justified. It may be stated, however, that the ranges of dispersion of these distributions do not exceed 10 days. In order to allocate precisely the growth periods, the day midway between average weighing days is also recorded.

Certain results evident from Table 2 are shown graphically in Figure 1. The graph gives, for each sex, the mean monthly gains or rates of growth per month from the sixth through the fourteenth year of age. The monthly gains[3] in every case were reduced to a 30-day basis. The method of reduction was simply to divide the average

[3] Publication limitations do not permit the tabulation of the calculated 30-day values, but these may be obtained or verified from the basic data in Table 2.

gain for the interval under consideration by the average number of days in that interval and to multiply the resulting quotient by 30. The monthly gains for the summer periods were based upon growth intervals of approximately three and one-third months' duration, but for purposes of comparison, reductions also were made to the 30-day basis.

It will be seen that at every age for both boys and girls the growth rates are at a maximum for the periods centering about October 6. The rates for November show a sharp reduction for every class. About December 1, growth is reduced from one-third to one-half of the November value, and the January, February, and March rates generally follow, with some fluctuations, horizontal or slightly down-

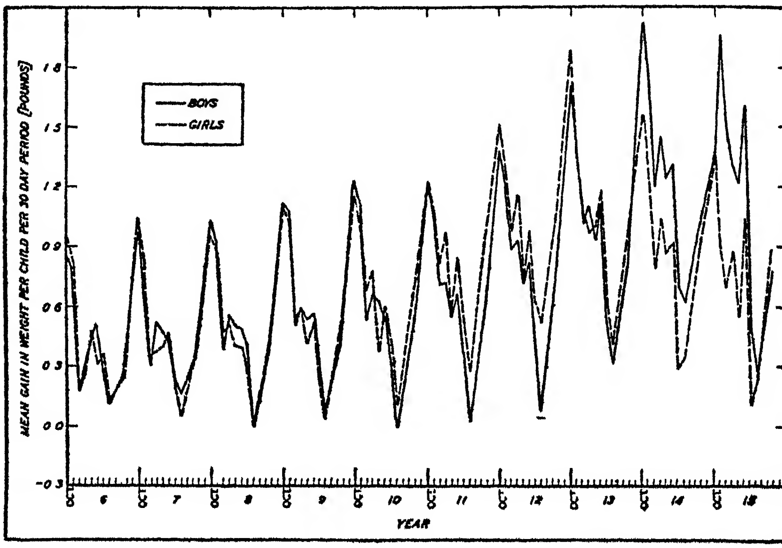

FIGURE 1. —Seasonal variation of average monthly growth rates, as observed in yearly age groups of elementary school children, Hagerstown, Md.

ward trends. The April gains show a reduction to approximately one-half of the winter values, and the May increments drop to a very low minimum. The average rates for the summer show a definite rise, in most cases closely approaching those of March 1. The summer rates are not precisely comparable with the preceding monthly rates, and very probably represent continued slow growth during June and, likely, July, followed by a fairly sharp rise during August and September. The seasonal trend is similar for all age groups, the older children showing, perhaps, slightly more marked relative changes, but the essential character of the curve is typical for every age and for both sexes.

The question may be raised that the large gains in weight observed in the fall and the small gains recorded for the spring may be effected

by seasonal changes of clothing weights. It must be remembered, in this connection, that the children were weighed without shoes, coats, vest, sweaters, or outdoor wraps. The usual clothing worn during the weighing consisted, for girls, of underwear, stockings, slip, and dress; for boys, of underwear, stockings, shirt, and trousers. It may be stated, as the considered opinion of those workers who collected the data, that for many of the children neither the quality nor quantity *of the garments under discussion* varied during the school year. To be sure, some of the children wore heavier stockings and underwear, and some of them wore heavier outer garments during the colder months of the year. In general, such garments appeared in November, although many were worn only during December, January, and February. It is reported as uncommon to find so-called "winter" clothing on the school children of Hagerstown after April 15. There is, therefore, good evidence that neither maximal nor minimal rates of growth fall at the times of greatest clothing changes.

A further point bearing on the interpretation of the curves of Figure 1 as representative of true seasonal variations in growth increments may be made. Maximal growth periods were observed for the months ending, on the average, October 15 and November 15. During these months, growth rates were approximately 0.6 pound per child (in the 6-year-old children) to 1.0 pound per child (in the 14-year-old children) per month greater than the growth rates for the winter months. An attempt to attribute the higher rates for October and November to changes in clothing weights must assume that the weight of clothing of the average child increases from 1.2 to 2.0 pounds from September 15 to November 15. Further, if the deceleration in growth during April and May is to be attributed to clothing changes, it must be assumed that the clothing weight of the average child decreases from approximately 0.8 pound (in 6-year-old children) to 1.5 pounds (in 14-year-old children) from March 15 to May 15. The sum of these values implies an average variation in weight of clothing of 2.0 pounds (in 6-year-old children) to 3.5 pounds (in 14-year-old children). It must be understood that these values are not postulated weights of the clothes themselves, but postulated *variation* in the weight of the clothes. It will be evident to those familiar with weights of children's clothes that such average variations are exceedingly unlikely to occur.

If the graph in Figure 1 is regarded as a continuous curve from the sixth through the fifteenth year, it is seen that the difference between the rates for boys and girls fluctuates irregularly from month to month until the end of the seventh year. During the next two years, except for 4 of the 18 intervals, the rates of growth are higher for boys than for girls. The differences were not found to be indi-

vidually statistically significant,[4] in spite of the size of the samples dealt with; and although no great stress is placed upon this point, it is at least suggestive that during the eighth and ninth years boys grow at slightly greater rates than girls. In March of the tenth year, the rate for girls rises above that for boys, and from this time until autumn of the thirteenth year girls grow more rapidly than boys It is to be observed that the growth of girls is very markedly increased over the growth of boys during the spring and summer of the tenth, eleventh, twelfth, and thirteenth years. By the beginning (October) of the fourteenth year, the monthly rates for the boys rise sharply above those for girls, and continue at greatly increased values until the close of the fifteenth year.

The characteristic sex differences of the so-called "adolescent acceleration" of growth have been discussed extensively in the literature of physical anthropology. As far as is known, however, a differential sex difference with respect to season has not been observed Although conclusions must be drawn with considerable caution, the data in this report indicate that, although girls grow more rapidly than boys during the whole interval from the tenth to the fourteenth year, it is principally during the spring and summer that the velocities of growth for girls greatly exceed those for boys. Further, it is indicated that, although boys grow more rapidly than girls during the fourteenth and fifteenth years, it is principally during the fall and winter that rates for boys greatly surpass those for girls. Considerations of why these particular sex differences appear are, at present, only speculative. It may be suggested that boys exercise more vigorously in the spring and summer, and therefore gain relatively less in weight. Gray (16), Mumford (17), Schwartz (18), and many others, however, have shown that regulated exercises are conducive to large and rapid gains in weight. It may be argued that differences in clothing weight of the sexes would produce the observed variation. Although this can not be clearly contradicted, the consistently higher gain of girls during the entire spring and summer, and of boys during the entire autumn and winter seasons makes the validity of the criticism reasonably doubtful.

Figure 2 presents the same basic material as is shown in Figure 1, but in this case the rates are plotted for specific months of the year.

If the trends for separate months for boys from the sixth to the eleventh year only are considered, it will be observed that during October, November, and December there is a rapid increase in monthly growth rates; for the months of January, February, March,

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[4] For the analysis of the significance of the difference of rates, the standard deviation of a 30-day period was obtained by arithmetic interpolation This is equivalent to a scale change, and the corrected standard deviation obtained is taken only as a close approximation of the standard deviation of a distribution of increments for exactly 30-day intervals.

and also for the summer interval, the rates increase definitely, but more slowly; during April and May there is very little age change in the rates. In general, these trends are linear; i. e., when straight lines were fitted to the monthly rates for this segment of the growth period, it was found that no rate deviated more than three and one-half times its probable error from the appropriate fitted straight line. The importance of this finding is enhanced by the discussion which has arisen in recent literature (Davenport (19), Todd (20), and others) regarding what has been termed the "pre-adolescent slump" or "adolescent lag" of growth. This phenomenon is said to occur

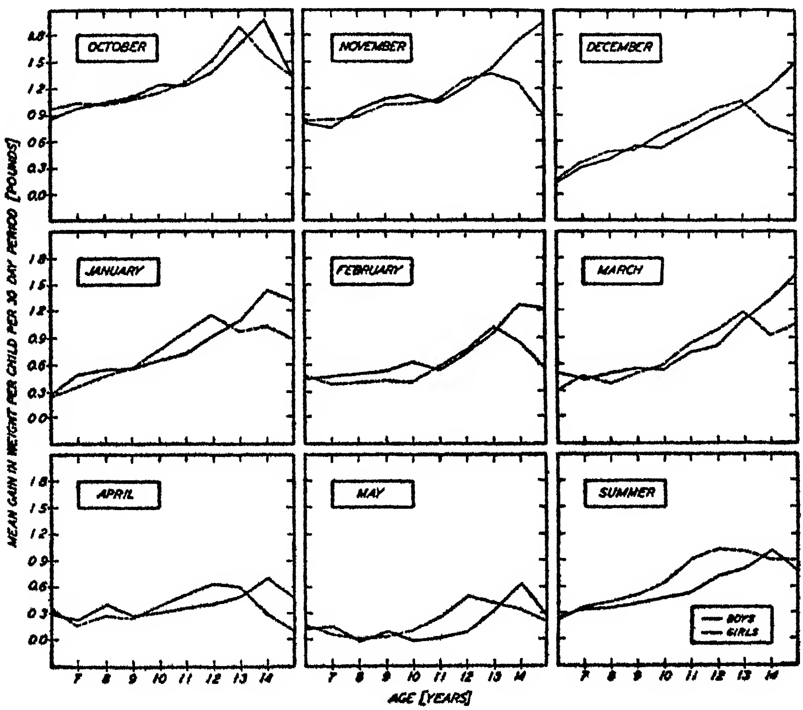

FIGURE 2. Variation of average growth rates with age during specific periods of the year, as observed in yearly age groups of elementary school children, Hagerstown, Md

during the tenth to the twelfth year and to be pronounced only in boys. It is not found in all data; and as far as can be ascertained from the literature available, none of its proponents has tested, by quantitative methods, the significance of the difference of growth rates. Its presence necessarily postulates that the slope of the actual growth curve be less during the "slump" period than just previous to that period. One method of determining the characteristics of the phenomenon would be to study the rate of change of the curve of growth in weight at frequent intervals immediately preceding and during the postulated acceleration. Such rate constants of the growth

curve are furnished in this study by the average gains during successive months. The analysis given thus far shows that these rates of growth from the sixth to the eleventh year follow linear trends with positive slopes. This fact must be interpreted as meaning that average growth itself is following a constant positively accelerated course.

To continue the analysis further, it may be observed that during the twelfth year the monthly rates for boys show sudden marked increases for nearly every month. In fact, every rate for the twelfth year lies above the straight lines fitted to the rates of the previous six years (five of the nine specific rates are three or more times their probable errors above the fitted lines). The rates for the different months of the thirteenth and fourteenth years show the rapid acceleration of growth characteristic of this period of development. By the fifteenth year the majority of the rates for boys are reduced, and it is evident that the maximum point of the "adolescent acceleration" has been passed. The age limitation of these data makes it impossible to continue the analysis further or to compare the curve of rising rates with the curve of falling rates.

In summary of this phase of the study it may be stated that average growth in weight of boys follows a constant positively accelerated trend from the sixth through the eleventh year. Beginning abruptly in the twelfth year and continuing to a maximum in the fourteenth year, growth is very markedly accelerated. During the fifteenth year, growth rates generally decrease. There is no statistically significant evidence in these data of a pre-adolescent "slump" or "lag" of growth in weight.

Changes of the monthly growth rates for girls (fig 2) present certain of the same characteristics that were observed in boys Growth rates during the separate months of the sixth to the tenth year, with the exception of February and May, follow fairly regular upward trends. In the spring and summer of the ninth year, however, there is evidence of an acceleration of growth. During the tenth year this acceleration becomes quite general, except for October and November, which months do not show a pronounced increase until the eleventh year. It would appear as an important finding that the phase of accelerated growth in girls begins gradually, and that not until the third year after its inception does it appear to persist through every month of the year. For the periods January, April, May, and the summer, maximum growth rates are found in the twelfth year. During the months of October, November, December, February, and March, the highest rates are found in the thirteenth year. Attention thus is directed again to the fact that the "adolescent acceleration" in girls tends to begin at an earlier age and to reach a maximum at an earlier age during the spring and summer than during the fall and winter.

The fourteenth year is marked by a deceleration, and by the fifteenth year the velocity of growth is very much reduced.

It will be observed that for certain periods, October, November, February, and for the summer, the deceleration of growth following the maximum point is fairly symmetrical with the acceleration before the maximum point. For the other months there is some irregularity in the rise and fall of the rates For December and April the velocities of growth show gradual increases from the ninth to the thirteenth year, followed by sharp decreases in the fourteenth and fifteenth years The months of January, March, and May, on the other hand, show more rapid acceleration of growth prior to the maximum, followed by less marked declines during the fourteenth and fifteenth years. These fluctuations for the different months appear not to follow a systematic trend; and although no definite statistical analysis of the form of the ascending and descending limbs of the velocity curves has been made, it seems reasonable to believe that, for girls, the pubescent change in growth rates is, on the average, a fairly symmetrical process. It is more likely, perhaps, that if the data were combined to give average *yearly* growth rates, a fairly smooth symmetrical curve would result. These findings may be considered, therefore, as corroborating the results obtained by Davenport (21), who showed, on the basis of yearly increments, that the "adolescent spurt" for boys is essentially a symmetrical phenomenon. This character of symmetry, together with the seasonal differential in the appearance of the accelerated phase of growth, necessarily implies that the *duration* of the accelerated phase must vary in different months. Such, indeed, appears to be roughly true. A careful inspection of the detailed statistics indicates that the "adolescent acceleration" is completed in four to five years in the fall and early winter months, and is not completed until five to six years in the spring and summer.

A summary picture of the cyclic character of the average growth in weight is shown in Figure 3, which was obtained by adding to the average weight at 6 years of age the successive monthly and summer increments through those of the fifteenth year.[5] The nature of the seasonal wave is clearly evident The manner of forming this growth curve permits also a more exact analysis of certain differences between the sexes. It is shown in Figures 1 and 2 that the rates of growth for girls become distinctly greater than those for boys during the tenth

[5] The results of adding together the average number of days per short-time interval of growth are, in these data, to give so-called years of growth of slightly greater duration than 365 days The variation introduced by this factor is not of material significance for the calculation of short-time growth *rates*, but is of considerable importance when the increments are cumulated to show accumulated growth For this reason corrections to years of exactly 365 days' duration have been made by arithmetic interpolation The curve shown in Figure 3 represents, as far as the time interval is concerned, an actual average growth curve built up from the average increments for each month (and summer) for children from the sixth through the fifteenth year.

year. The mean weight of boys, however, remains greater than that of girls until the early part of the eleventh year. Furthermore, although the rates of growth for boys become greater than the rates for girls during the fall of the fourteenth year, the absolute weights of boys do not equal those of girls until the fifteenth year. This question of the times of decussation of the growth curves for the two

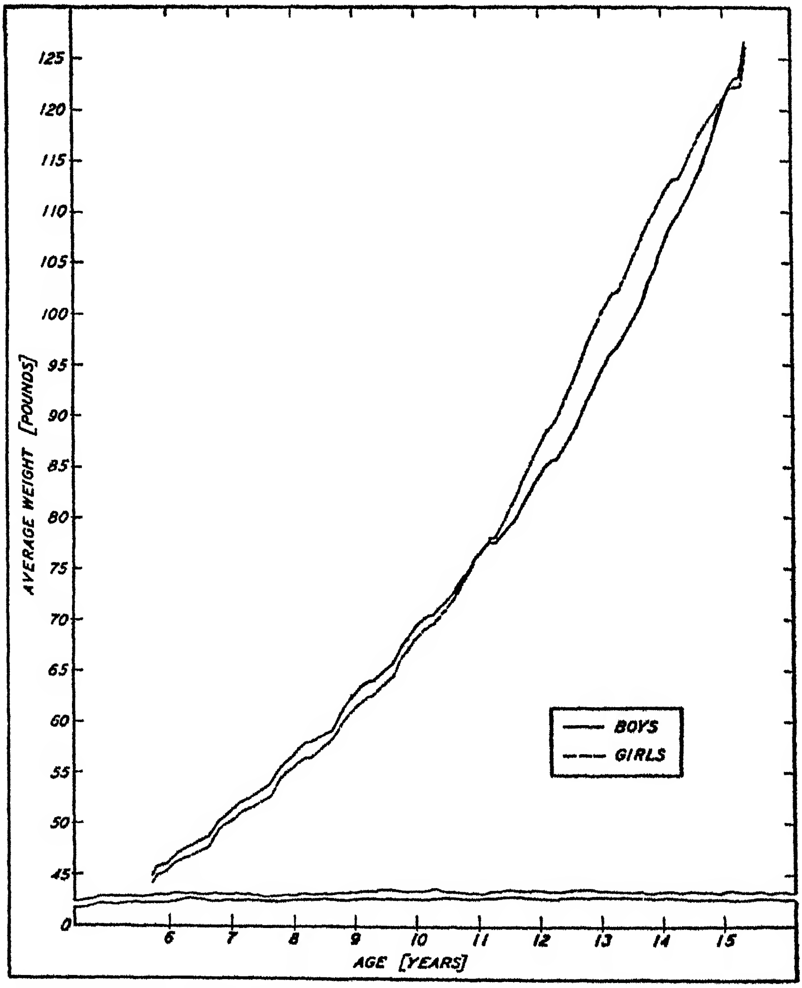

FIGURE 3.—Growth in average weight, based upon monthly and summer weight increments, of elementary school children, Hagerstown, Md

sexes has been discussed by nearly every writer on the physical growth of children. The point will not be discussed further here, except to state that the data presented are in general agreement with the findings of most workers, and it may be considered as fairly well established that the points of decussation of average weight curves

for the two sexes of native-born white children occur in the eleventh and fifteenth years.

The analysis of the data for the presentation of Figure 3 brings out another point of considerable interest. When the yearly gains in weight, found by adding the appropriate monthly and summer increments, are compared with the yearly gains, found by differencing the mean weights for successive years of age, it is observed that the former are larger, particularly for children from 12 to 16 years. This point is emphasized most strikingly by the fact that the average weight of the 16-year-old girls is 1.7 pounds less than the average weight of the 15-year-old girls, although the sum of the monthly increments for girls between these ages totals approximately 10 pounds.[6] This latter example is based upon very few cases, but it serves to illustrate the process of selective sampling which, without doubt, occurs in these data.

The general preferential factors which operate in the selection of such populations have been enumerated many times, but it seems worth while to consider, briefly, several of those which, it is reasonable to believe, are most effective in making ordinary elementary school populations in this country unrepresentative of the population in general. Of primary importance in this regard is the selection of the pupils who leave the group either to go to high school or to work. Frankel and Dublin (22) have shown, for New York City, that it is the heavier, taller, and more robust child that applies for an employment certificate. It has been shown, also, Porter (23), Boas and Wissler (24), and Schiotz (15), that the average heights and weights of children of the same age are very materially greater as those children are found in higher grades in school. Recently Richey (25) and Boas (26) have shown that on the average the larger and heavier child passes through the period of "adolescent acceleration" at an earlier age than the shorter, lighter child. Taken altogether, these facts indicate that the older children in the elementary school group not only weigh, on the average, slightly less than a random sample of children of the same age, but that they, due to the later appearance of the accelerated phase of growth, are probably growing more rapidly than children of the same age who have already left the elementary schools. The data presented in this paper show that the average weight found for 14-year-old boys is approximately 5 pounds greater, and the average weight found for 14-year-old girls is nearly 4 pounds greater when the average is based upon monthly growth rates rather than upon mean weights in the school population. The factors which have brought about these differences are

[6] The distributions of October weights for 16-year-old children contain only a few individuals, and it was not considered worth while to publish the constants of the frequency distributions for these groups.

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influenced by selective elements so that average weights based upon accumulated monthly increments do not truly represent the weight characteristic of the population. Also, it is doubtless true that the weight-age tables used in this country, which are in almost every case taken from elementary school groups, are not applicable to the population at large.

In a recent paper, Emerson (27) has attacked the interpretation of seasonal variations in growth as reported by Malling-Hansen,

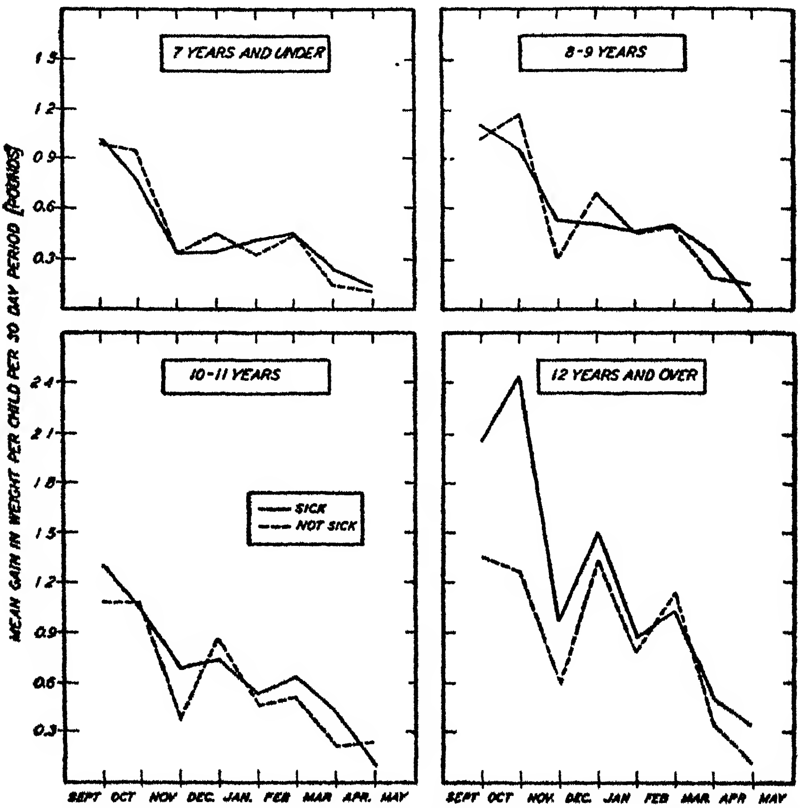

FIGURE 4. Comparison of seasonal variation of average monthly growth rates for children not absent from school during entire year because of sickness, with average monthly growth rates for children absent one or more days because of sickness.

Schmidt-Monnard, Porter, Bleyer, and others. That writer conceives that the seasonal cycle is not a "general biologic law." It is implied that lack of "hygienic living conditions," "acute infections," "fatigue," etc., are examples of nonbiologic phenomena. Emerson's report concludes with the statement:

Growth of children living under favorable conditions can be found who, in the absence of infection or other sicknesses, exhibit a regular monthly gain in weight regardless of the season of the year.

It is implied in this quotation, and in other parts of the paper, that the seasonal variation as found by numerous careful workers is, in some manner, atypical of normal growth. It seems, therefore, justifiable to consider to what extent the evidence in this study is confirmatory.

It was stated that the material used in the present study may be considered as selected in that only the records of children present on 80 per cent of the weighing days for four years out of five were utilized. It seems reasonable to assume, therefore, that the results obtained are representative of a group of fairly healthy children. However, because records of absence from school were reported as part of the general health study, it is possible to carry this selection further. Figure 4, for which the data [7] were calculated as for Figure 1, was made in order to compare the growth rates for those children *who were not absent from school because of sickness at any time during a specified school year* with the growth rates of the remainder of the group. It is evident that this criterion for selecting a group of normal, healthy children is purely arbitrary, but it seems sufficient for present purposes. In each age class the number of children not sick is relatively small, the actual numbers ranging from 65 children in the 12-year and over class to 210 children in the 8 and 9 year old class. The variability of these samples is obviously great, and it is impossible to show a statistically significant difference between the sick group and the not-sick group. The absolute irregularity of the difference between the two groups accompanied by the systematic regularity with which the seasonal trends coincide presents, however, very strong evidence that the typical seasonal variation is not the result of including in the data records of seriously ill children who fail to gain or who lose weight.

The general problem is amplified in the data presented in Figure 5. Average monthly growth rates [8] for children of all ages of each sex are shown in this graph, together with the average sickness rates found by Collins (28) in the school children of Hagerstown for the school months from December, 1921, to May, 1925. The periods covered by these data are not strictly comparable, but for present purposes this is immaterial. It is evident that no clear relationship exists between the general incidence of sickness and seasonal growth in average weight.

The latter findings are, of course, in no way contradictory to the common knowledge that sickness can and does prevent normal growth. In no way, either, do they fail to substantiate the meticulous work of Malling-Hansen, which shows that the seasonal trend *can* be

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[7] For this comparison, records were grouped into approximately 2-year age classes, and the sexes were combined. The procedure was justified on the grounds that no large error will be made by such grouping, and that the effects of random sampling will be very much reduced.

[8] These rates are simply the unweighted arithmetic averages of the monthly rates presented in Table 1.

affected by sickness. The evidence is, however, reasonably conclusive that the observed seasonal variation of growth in weight can not be explained as the result of either individual or group illnesses.

SUMMARY AND CONCLUSIONS

Under the supervision of the medical officers of the United States Public Health Service, approximately 2,500 native-born white children

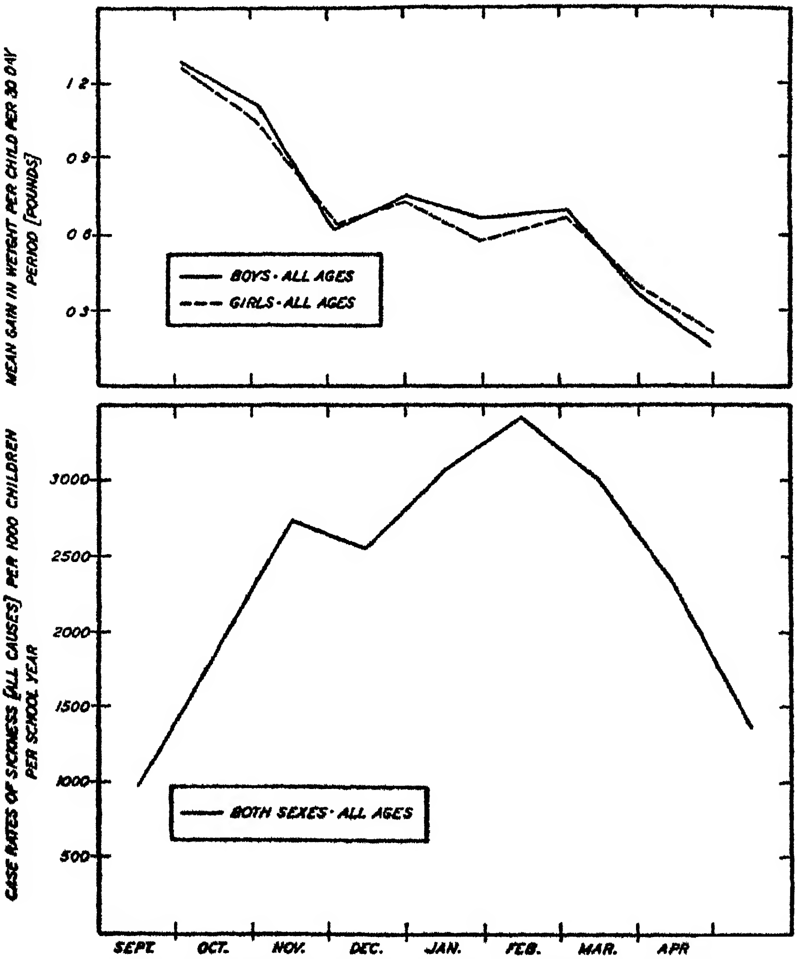

FIGURE 5.—Seasonal variation of average monthly growth rates and seasonal variation of sickness incidence rates, as observed in elementary school children, Hagerstown, Md.

attending the elementary schools of Hagerstown, Md., were weighed monthly during the school years from September, 1923, to May, 1928.

The basic data, specific for sex and single years of age, but unspecified with respect to the year of measurement, were analyzed by

the calculation of the ordinary statistical constants (Mean, σ, β_1, and β_2) of the following frequency distributions:

(1) Actual weight on the October weighing day.

(2) Weight increments for the separate months of the school year from September to May.

(3) Weight increments for the summer vacation period, an interval of approximately three and one-half months.

The results of the analysis may be summarized under six headings:

(1) Maximum rates of average growth in weight are observed during the fall months, intermediate rates during the winter, and minimum rates during the spring. The average rate of growth during the summer period is approximately equal to the rates observed during February and March. The same cyclic changes are observed in both sexes and for each yearly age group from the sixth through the fourteenth year. These findings are in agreement, with few exceptions, with the previous work on the subject.

(2) During the sixth and seventh years, there is no consistent difference between the growth rates of boys and girls. During the eighth and ninth years, boys apparently grow at slightly greater rates than girls. In the spring of the tenth year, the rates for girls become greater than the rates for boys and remain higher for each subdivision of the year until the fall of the fourteenth year, when the rates for boys become greater and remain so through the fifteenth year.

(3) Analysis of the changes with age of growth rates for individual months shows:

(*a*) Maximum growth rates for girls in the eleventh and twelfth years.

(*b*) Maximum growth rates for boys in the fourteenth and fifteenth years.

(*c*) No evidence which may be interpreted as representing a "pre-adolescent slump" or "lag" of average growth in weight.

(4) Suggestive evidence is brought out of a seasonal sex difference in the appearance of the "adolescent acceleration" of average weight growth. The "adolescent acceleration" in girls is apparently more pronounced in the spring and summer, and in boys is more pronounced in the fall and early winter.

(5) Comparison of the monthly growth rates of a selected group of children who were not absent from school during an entire year with the remainder of the group who were absent one or more days because of sickness shows that the typical seasonal variation in growth is not the result of including in the data records of seriously ill children who fail to gain or who lose weight.

(6) Comparison of the seasonal curve of monthly growth rates with the seasonal curve of incidence of sickness indicates that there is no concomitant variation between the two.

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COURT DECISION RELATING TO PUBLIC HEALTH

Bovine tuberculosis eradication law construed.—(Iowa Supreme Court; Peverill *v.* Dept. of Agriculture of Iowa et al. (Cheney et al., Interveners), 245 N. W. 334; decided Nov. 22, 1932.) Injunctions were sought to restrain the testing of cattle for tuberculosis. The lower court denied the injunctions and its decrees were affirmed by the supreme court. The points decided by the appellate court in its construction of the pertinent statutory provisions were, briefly stated, as follows:

Cattle could be tuberculin tested before being appraised.

The legislature did not intend to differentiate between an "examination" of a herd and the administration of the tuberculin test, but regarded the tuberculin test as a part of the examination.

Section 2666 of the code, which provided that "Said department shall proceed with the examination, including the tuberculin test, of all such cattle as rapidly as practicable", was not obsolete, as it was a part of the existing statutory law of the State and courts could not repeal legislative acts by declaring them obsolete.

Notice to cattle owners of the day and hour when testing would be performed was not required.

The veterinary designated to administer the tuberculin test could not be required to give a bond, as the legislature had not required a bond and the courts were without power to add to the law.

Where there was a substantial balance in the State bovine tuberculosis eradication fund, the contemplated work of testing cattle in a county would not be unlawful because of the fact that the eradication fund of that county was overdrawn.

DEATHS DURING WEEK ENDED FEBRUARY 11, 1933

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Feb. 11, 1933	Corresponding week, 1932
Data from 85 large cities of the United States:		
Total deaths	8,422	8,313
Deaths per 1,000 population, annual basis	11.8	11.9
Deaths under 1 year of age	590	650
Deaths under 1 year of age per 1,000 estimated live births [1]	51	54
Deaths per 1,000 population, annual basis, first 6 weeks of year	12.7	12.0
Data from industrial insurance companies:		
Policies in force	69,070,242	74,068,315
Number of death claims	15,399	11,487
Death claims per 1,000 policies in force, annual rate	11.6	8.1
Death claims per 1,000 policies, first 6 weeks of year, annual rate	11.8	9.7

[1] 1933, 81 cities; 1932, 78 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks ended February 18, 1933, and February 20, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended February 18, 1933, and February 20, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Feb. 18, 1933	Week ended Feb. 20, 1932	Week ended Feb. 18, 1933	Week ended Feb. 20, 1932	Week ended Feb. 18, 1933	Week ended Feb. 20, 1932	Week ended Feb. 18, 1933	Week ended Feb. 20, 1932
New England States:								
Maine	1	6	56	40	3	589	1	0
New Hamphsire	1	2	8		1	9	0	0
Vermont	2				4	45	0	0
Massachusetts	22	63	19	18	265	427	0	2
Rhode Island	5	2	4		3	656	0	0
Connecticut	3	9	38	21	159	278	0	2
Middle Atlantic States:								
New York	67	132	[1] 41	[1] 158	1,993	1,969	4	10
New Jersey	22	49	91	56	818	161	2	1
Pennsylvania	99	106			866	1,405	10	2
East North Central States:								
Ohio	59	33	208	22	455	267	2	0
Indiana	37	48	55	122	25	87	3	4
Illinois	48	120	72	164	270	228	11	12
Michigan	21	56	6	61	920	294	1	0
Wisconsin	3	18	227	301	286	274	0	1
West North Central States:								
Minnesota	2	8	1	3	1,387	25	1	1
Iowa	16	9		4	3	7	2	1
Missouri	30	32	25	19	37	21	2	2
North Dakota	5	1	228		90	54	0	0
South Dakota	9	2	1	228	21	81	1	0
Nebraska	14	6	1	269	28	65	1	3
Kansas	6	21	13	17	331	70	0	11
South Atlantic States:								
Delaware	12	2	5	6	2	2	0	0
Maryland [2]	14	25	117	28	4	32	2	5
District of Columbia	10	20	3	2	5	3	0	0
Virginia	18				444		1	1
West Virginia	18	26	271	96	552	396	0	1
North Carolina	15	28	832	52	555	243	3	1
South Carolina	8	12	1,824	564	56	49	0	0
Georgia [3]	11	14	491	121	14	7	1	3
Florida	3	11	61	2	10	9	1	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended February 18, 1933, and February 20, 1932—Continued

Division and State	Diphtheria: Week ended Feb. 18, 1933	Diphtheria: Week ended Feb. 20, 1932	Influenza: Week ended Feb. 18, 1933	Influenza: Week ended Feb. 20, 1932	Measles: Week ended Feb. 18, 1933	Measles: Week ended Feb. 20, 1932	Meningococcus meningitis: Week ended Feb. 18, 1933	Meningococcus meningitis: Week ended Feb. 20, 1932
East South Central States:								
Kentucky	10	48	118	226	-	103	1	3
Tennessee	15	35	168	169	52	64	3	5
Alabama	13	23	192	92	13	2	1	0
Mississippi	1	11					1	2
West South Central States:								
Arkansas	5	9	113	65	4	3	1	0
Louisiana	16	32	51	10	27	6	2	1
Oklahoma [4]	16	15	228	1,075	20	12	5	0
Texas [3]	54	42	252	148	679	44	1	2
Mountain States:								
Montana	-		93	1,708	154	102	0	2
Idaho	3	1	1	3	90		0	1
Wyoming			2		10	1	1	0
Colorado	6	10	68		3	61	1	1
New Mexico	7	21	11	27	4	106	0	0
Arizona	2	6	12	68			1	0
Utah [2]	3	2			3		1	0
Pacific States:								
Washington	8	1	1		6	480	1	1
Oregon	1	8	91	257	111	104	0	0
California [1]	52	45	129	303	449	315	3	8
Total	791	1,170	5,731	6,525	11,122	9,186	75	89

Division and State	Poliomyelitis: Week ended Feb. 18, 1933	Poliomyelitis: Week ended Feb. 20, 1932	Scarlet fever: Week ended Feb. 18, 1933	Scarlet fever: Week ended Feb. 20, 1932	Smallpox: Week ended Feb. 18, 1933	Smallpox: Week ended Feb. 20, 1932	Typhoid fever: Week ended Feb. 18, 1933	Typhoid fever: Week ended Feb. 20, 1932
New England States:								
Maine	0	0	20	38	0	0	1	2
New Hampshire	0	0	44	28	0	0	0	0
Vermont	0	0	12	7	0	3	0	0
Massachusetts	1	1	300	543	0	0	3	4
Rhode Island	0	0	40	40	0	0	0	0
Connecticut	0	0	97	112	1	2	0	1
Middle Atlantic States:								
New York	1	5	738	1,121	0	2	5	10
New Jersey	0	0	314	279	0	0	1	2
Pennsylvania	0	1	856	613	0	0	10	13
East North Central States:								
Ohio	0	2	746	281	6	31	2	3
Indiana	2	0	133	101	1	17	1	1
Illinois	0	3	435	410	11	1	6	4
Michigan	1	2	528	489	0	3	6	13
Wisconsin	0	0	98	92	3	0	1	3
West North Central States:								
Minnesota	0	0	77	120	1	1	8	0
Iowa	0	1	31	41	25	24	0	1
Missouri	0	0	50	83	1	12	2	1
North Dakota	0	0	11	45	0	3	0	1
South Dakota	0	0	21	3	2	9	2	1
Nebraska	0	0	24	21	1	8	0	0
Kansas	0	0	78	50	2	5	1	0
South Atlantic States:								
Delaware	0	0	5	12	0	0	0	1
Maryland [3]	0	0	81	113	0	0	1	4
District of Columbia	0	0	11	27	0	0	0	0
Virginia	0	1	36		0		3	
West Virginia	0	0	25	51	0	0	7	3
North Carolina	0	2	20	29	0	5	3	3
South Carolina	0	0	2	6	0	0	8	3
Georgia [3]	0	0	9	14	0	0	9	4
Florida	0	1	7	14	0	0	6	13

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended February 18, 1933, and February 20, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Feb. 18, 1933	Week ended Feb. 20, 1932	Week ended Feb. 18, 1933	Week ended Feb. 20, 1932	Week ended Feb. 18, 1933	Week ended Feb. 20, 1932	Week ended Feb. 18, 1933	Week ended Feb. 20, 1932
East South Central States:								
Kentucky	2	2	30	56	0	7	6	13
Tennessee	1	1	30	50	1	8	4	11
Alabama	0	1	21	16	3	5	0	5
Mississippi	0	0	8	14	4	37	2	7
West South Central States:								
Arkansas	0	0	4	10	3	37	3	0
Louisiana	0	1	2	19	2	3	6	28
Oklahoma [4]	1	0	24	10	4	1	1	1
Texas [3]	0	0	55	44	8	26	14	4
Mountain States:								
Montana	0	0	31	54	2	2	0	1
Idaho	0	0	3	2	5	4	0	1
Wyoming	0	1	11	3	0	0	0	0
Colorado	0	1	25	40	0	2	1	1
New Mexico	0	0	12	8	0	1	0	1
Arizona	0	0	14	11	0	0	3	0
Utah [2]	0	0	9	5	0	0	0	0
Pacific States:								
Washington	0	0	39	37	5	15	3	0
Oregon	0	0	30	25	6	16	1	1
California [3]	1	3	208	132	33	17	4	5
	10	29	5,504	5,640	130	310	124	170

[1] New York City only.
[2] Week ended Friday.
[3] Typhus fever, week ended Feb. 18, 1933, 6 cases; 3 cases in Georgia, 2 cases in Texas, and 1 case in California.
[4] Figures for 1933 are exclusive of Oklahoma City and Tulsa and for 1932 are exclusive of Tulsa only.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
January, 1933										
Alabama	10	86	4,657	34	11	17	5	89	4	12
Florida		45	445	27	12	1	0	36	0	12
Maryland	13	53	4,378		24		1	403	0	9
Massachusetts	9	136	866	2	601		1	1,661	0	13
Minnesota	8	45	248		1,760		1	380	6	4
New Jersey	7	123	1,506		1,669		2	1,240	0	7
New York	24	287			5,260		5	3,217	0	35
Ohio	11	236	1,331		2,565		3	2,440	37	24
Tennessee	15	71	5,437	21	22	8	2	187	2	26

January, 1933

	Cases
Actinomycosis:	
Minnesota	1
Chicken pox:	
Alabama	97
Florida	81
Maryland	667
Massachusetts	1,715
Minnesota	562
New Jersey	2,023
New York	3,728
Ohio	2,623
Tennessee	326
Diarrhea:	
Maryland	8
Diarrhea and enteritis:	
Ohio	7
Dysentery:	
Maryland	3
Massachusetts	1
Minnesota	2
Minnesota (amebic)	1
New York	7
Tennessee	1
Food poisoning:	
Ohio	17
German measles:	
Maryland	7
Massachusetts	27
New Jersey	39
New York	101
Ohio	19
Tennessee	17
Impetigo contagiosa:	
Maryland	21
Tennessee	8
Lead poisoning:	
Massachusetts	1
New Jersey	1
Ohio	6

	Cases
Lethargic encephalitis:	
Alabama	2
Massachusetts	1
Minnesota	1
New Jersey	2
New York	8
Ohio	4
Tennessee	3
Mumps:	
Alabama	133
Florida	1
Maryland	342
Massachusetts	750
New Jersey	1,070
Ohio	917
Tennessee	100
Ophthalmia neonatorum:	
Maryland	6
Massachusetts	110
New Jersey	4
New York	3
Ohio	88
Tennessee	6
Paratyphoid fever:	
New York	1
Tennessee	1
Puerperal septicemia:	
Ohio	10
Tennessee	1

	Cases
Rabies in animals:	
Maryland	2
New Jersey	17
New York [1]	1
Tennessee	23
Scabies:	
Maryland	1
Tennessee	24
Septic sore throat:	
Maryland	15
Massachusetts	11
New York	24
Ohio	329
Tennessee	15
Tetanus:	
Maryland	1
Massachusetts	2
New York	3
Ohio	1
Tennessee	2
Trachoma:	
Massachusetts	5
New Jersey	1
Ohio	6
Tennessee	33
Trichinosis:	
New York	10
Tularaemia:	
Alabama	1
Maryland	3

	Cases
Tularaemia—Continued.	
New Jersey	1
Ohio	7
Tennessee	2
Typhus fever:	
Alabama	10
Florida	2
Maryland	1
New York	1
Undulant fever:	
Maryland	1
Minnesota	7
New Jersey	3
New York	21
Ohio	5
Vincent's angina:	
Maryland	7
New York [1]	102
Tennessee	5
Whooping cough:	
Alabama	131
Florida	24
Maryland	108
Massachusetts	739
Minnesota	324
New Jersey	373
New York	1,838
Ohio	409
Tennessee	93

WEEKLY REPORTS FROM CITIES

City reports for week ended February 11, 1933

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	2	19	2	0	2	3	0	1	0	6	31
New Hampshire:											
Concord	0		0	0	1	1	0	0	0	0	12
Manchester	0		6	0	6	3	0	1	0	0	24
Vermont:											
Barre	0		0	0	0	0	0	1	0	0	5
Burlington	0		0	0	0	0	0	0	0	0	5
Massachusetts:											
Boston	7	3	4	18	36	94	0	13	0	46	229
Fall River	1	4	4	0	2	4	0	2	0	12	30
Springfield	0		0	3	1	6	0	1	0	20	41
Worcester	0		0	3	6	13	0	2	0	4	
Rhode Island:											
Pawtucket	0		0	0	0	0	0	0	0	0	14
Providence	2	4	4	0	10	17	0	3	0	3	81
Connecticut:											
Bridgeport	1	2	0	12	3	9	0	1	0	1	37
Hartford	0	1	0	2	9	7	0	3	0	0	63
New Haven	0		2	0	8	3	0	0	0	6	40
New York:											
Buffalo	10	3	1	5	23	39	0	13	0	34	137
New York	50	56	28	890	172	277	0	90	5	93	1,529
Rochester	0		1	1	6	21	0	2	1	7	77
Syracuse	0		0	1	5	26	0	1	0	2	69
New Jersey:											
Camden	2	4	3	0	6	10	0	0	1	1	42
Newark	2	17	1	229	14	35	0	5	0	14	118
Trenton	0	6	2	0	4	22	0	5	0	6	41
Pennsylvania:											
Philadelphia	5	31	7	51	39	159	0	31	1	3	464
Pittsburgh	4	11	6	4	20	32	0	7	0	14	165
Reading	0		0	55	2	5	0	0	0	0	33
Scranton	3			0		14	0		0	1	
Ohio:											
Cincinnati	2	4	3	2	9	11	0	1	0	1	123
Cleveland	6	81	2	3	12	142	0	15	0	23	218
Columbus	0	1	1	114	0	7	0	4	0	8	85
Toledo	1	2	1	63	6	54	0	4	0	1	68
Indiana:											
Fort Wayne	6		1	0	1	1	0	0	0	0	25
Indianapolis	3		2	4	16	22	0	6	0	1	
South Bend	0		0	0	1	2	0	0	0	6	16
Terre Haute	1		0	0	1	8	0	1	0	0	23

[1] Exclusive of New York City.

City reports for week ended February 11, 1933—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Illinois:											
Chicago	0	9	8	143	46	215	0	39	1	7	650
Springfield	2	3	0	1	1	3	0	1	0	0	21
Michigan:											
Detroit	9	6	6	226	19	141	0	20	1	74	262
Flint	1	25	1	6	2	1	0	1	0	0	35
Grand Rapids	0	----	2	1	3	10	0	0	0	41	35
Wisconsin:											
Kenosha	0	----	0	0	0	0	2	0	0	7	6
Madison	0	----	----	31	----	0	0	----	0	0	----
Milwaukee	1	1	1	2	9	25	0	8	0	23	101
Racine	0	----	0	1	1	11	0	0	0	6	10
Superior	0	----	0	0	0	0	0	0	0	0	6
Minnesota:											
Duluth	0	----	1	2	0	2	0	1	0	8	18
Minneapolis	1	----	1	503	6	32	0	1	0	9	94
St. Paul	0	3	3	49	7	11	0	4	0	18	66
Iowa:											
Des Moines	8	----	----	0	----	1	0	----	0	0	23
Sioux City	4	----	----	0	----	2	0	----	0	3	----
Waterloo	1	----	----	0	----	0	0	----	0	0	----
Missouri:											
Kansas City	0	----	7	132	83	38	0	4	0	5	137
St. Joseph	3	----	1	6	3	2	0	0	0	1	26
St. Louis	17	4	0	5	12	23	0	13	0	3	189
North Dakota:											
Fargo	0	----	0	0	0	0	0	0	0	0	3
Grand Forks	0	----	0	3	0	0	0	0	0	0	----
South Dakota:											
Aberdeen	0	----	0	1	0	1	0	0	0	0	----
Nebraska:											
Omaha	5	----	0	4	7	9	0	3	0	0	57
Kansas:											
Topeka	0	----	2	27	1	4	0	0	0	0	25
Wichita	0	150	5	2	4	1	0	1	0	1	54
Delaware:											
Wilmington	0	----	0	2	3	3	0	2	0	0	32
Maryland:											
Baltimore	2	33	4	0	35	62	0	14	1	26	243
Cumberland	0	----	0	0	1	2	0	0	0	0	11
Frederick	0	----	0	0	0	1	0	0	0	0	5
District of Col.:											
Washington	6	5	5	1	13	11	0	15	0	4	181
Virginia:											
Lynchburg	1	----	0	2	0	2	0	1	0	0	4
Norfolk	2	----	0	1	2	1	0	0	0	1	22
Richmond	1	----	0	0	0	12	0	3	1	0	47
Roanoke	0	----	1	65	0	2	0	1	0	0	17
West Virginia:											
Charleston	0	1	0	0	1	0	0	1	0	0	10
Huntington	1	----		8	----	1	0	----	0	0	----
Wheeling	0	----	1	111	0	5	0	1	0	2	21
North Carolina:											
Raleigh	0	----	2	1	0	0	0	0	0	2	9
Wilmington	0	----	0	18	2	3	0	0	0	2	8
Winston-Salem	3	----	0	0	1	1	0	1	0	0	11
South Carolina:											
Charleston	1	114	1	0	2	0	0	6	0	0	22
Columbia	----	----	----	----	----	----	----	----	----	----	----
Greenville	0	----	0	8	0	0	0	0	0	0	----
Georgia:											
Atlanta	1	32	4	0	5	4	0	7	0	21	73
Brunswick	0	2	1	0	0	0	0	0	0	0	4
Savannah	1	111	2	0	1	0	0	2	0	0	32
Florida:											
Miami	3	44	4	1	3	0	0	3	0	2	37
Tampa	1	15	1	0	3	0	0	2	0	1	31
Kentucky:											
Ashland	0	----	0	10	0	0	0	0	1	0	----
Lexington	0	7	0	2	3	0	0	2	0	0	17
Louisville	2	1	0	0	14	10	0	2	1	0	85
Tennessee:											
Memphis	0	----	2	1	3	4	0	7	3	4	67
Nashville	0	----	4	2	2	3	0	2	0	2	43
Alabama:											
Birmingham	2	8	1	0	4	5	0	5	0	4	64
Mobile	----	----	----	----	----	----	----	----	----	----	----
Montgomery	0	----	----	0	----	0	0	----	0	0	----

City reports for week ended February 11, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Arkansas:											
Fort Smith	0			0		0	0		0	0	
Little Rock	0		0	0	7	0	0	0	0	0	7
Louisiana:											
New Orleans	9	9	11	1	5	7	1	8	2	7	145
Shreveport	1		0	1	3	0	0	1	0	0	20
Oklahoma:											
Tulsa	0			1		1	0		0	2	1
Texas:											
Dallas	9	3	3		12	5	1	2	0	0	73
Fort Worth	2		2	35	3	3	2	1	5	0	26
Galveston	2		0	4	2	5	0	1	0	0	11
Houston	5		0	67	6	2	2	4	2	0	53
San Antonio											
Montana:											
Billings	0		0	0	0	0	0	0	0	4	8
Great Falls	0		0	16	2	3	0	0	0	0	8
Helena	0		0	0	0	0	0	0	0	0	5
Missoula	0		0	2	0	1	0	0	0	0	0
Idaho:											
Boise	0		0	8	0	1	0	1	0	0	4
Colorado:											
Denver	3	73	7	2	8	7	0	4	0	1	88
Pueblo	0		1	0	5	0	0	0	1	4	16
New Mexico:											
Albuquerque	4	1	0	1	1	2	0	2	0	1	10
Arizona:											
Phoenix	1		0	0	0	3	0	0	0	0	
Utah:											
Salt Lake City	0		0	0	5	7	0		0	1	61
Nevada:											
Reno	0		0	0	0	0	0	0	0	0	4
Washington:											
Seattle	0			0		8	0		0	2	
Spokane	0			1		0	1		0	0	
Tacoma	0		0	0	3	2	0	0	0	0	34
Oregon:											
Portland	1	5	0	5	3	9	2	3	0	0	65
Salem	0	6	0	104	0	0	0	0	0	0	
California:											
Los Angeles	36	66	4	158	18	66	33	25	0	26	320
Sacramento	2	1	1	3	11	2	0	2	1	8	44
San Francisco	4	31	4	3	14	5	0	9	0	55	190

State and city	Meningococcus meningitis		Poliomyelitis cases	State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
Connecticut:				Missouri:			
Bridgeport	1	1	0	Kansas City	1	0	0
				St. Joseph	2	2	0
				St. Louis	1	2	0
New York:				Maryland:			
New York	5	0	1	Baltimore	0	1	0
New Jersey:				District of Columbia:			
Newark	0	1	0	Washington	3	1	0
Pennsylvania:				Tennessee:			
Philadelphia	1	1	0	Memphis	0	0	1
Ohio:				Louisiana:			
Toledo	1	1	0	New Orleans	2	1	1
Indiana:				Oklahoma:			
Indianapolis	1	1	0	Tulsa	1	1	0
South Bend	1	0	0				
Illinois:				Arizona:			
Chicago	15	6	1	Phoenix	0	1	0
Michigan:				Oregon:			
Detroit	1	0	0	Portland	0	1	1

Lethargic encephalitis.—Cases: Springfield, Mass., 1; Birmingham, 1.
Pellagra.—Cases: Charleston, S. C., 1; Atlanta, 2; Savannah, 1.; Birmingham, 2; New Orleans, 2.
Typhus fever.—Cases: Savannah, 2.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Week ended February 4, 1933.—The Department of Pensions and National Health of Canada reports cases of certain communicable diseases for the week ended February 4, 1933, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				1	2		1		2	6
Chicken pox		1		169	239	76	33	12	36	566
Diphtheria		4	4	22	11	7	1	3	4	56
Erysipelas		2		8		2	5	1	1	19
Influenza	10	34		12	519	14	3		27	619
Lethargic encephalitis					1					1
Measles		41	4	104	367		2	21	154	693
Mumps					171	20	1		11	203
Pneumonia		6			43		20		2	71
Poliomyelitis				1						1
Scarlet fever		1	3	99	73	12	27	5	8	228
Smallpox							2			2
Trachoma					5		2		2	9
Tuberculosis	1		17	96	39	22	18	1	14	208
Typhoid fever			1	24	4	11	2		2	44
Undulant fever					2					2
Whooping cough				139	108	25	58	3	25	358

GREAT BRITAIN

Influenza.—Deaths from influenza were registered in the 118 great towns of England and Wales and the 16 principal towns of Scotland during the three weeks ended February 4, 1933, as follows:

Week ended—	118 great towns, England and Wales	16 principal towns, Scotland
Jan. 21, 1933	1,569	108
Jan. 28, 1933	1,934	84
Feb. 4, 1933	1,911	98

The following table shows the general death rates per 1,000 population in towns of Great Britain during the three weeks ended February 4, 1933. This table is a continuation of the table which appears on page 161 of the Public Health Reports of February 10, 1933.

Deaths (all causes) per 1,000 population, annual basis

	Week ended—		
	Jan. 21, 1933	Jan. 28, 1933	Feb. 4, 1933
118 great towns of England and Wales	22.2	25.2	26.8
Greater London	20.9	22.6	24.4
Great towns in—			
Southeastern area	21.7	23.1	25.6
Northern area	24.4	28.6	28.8
Midland area	20.9	23.1	23.4
Eastern area	15.7	26.5	29.1
Southwestern area	20.3	19.6	28.2
Wales and Monmouthshire	16.5	26.7	33.6
Liverpool	24.6	25.7	28.2
Bristol	27.4	29.7	32.6
16 principal towns of Scotland	20.4	20.9	23.1
Glasgow	18.0	17.9	22.2

PUERTO RICO

Communicable diseases—Four weeks ended January 28, 1933.—During the four weeks ended January 28, 1933, cases of certain communicable diseases were reported in Puerto Rico, as follows:

Disease	Cases	Disease	Cases
Chicken pox	20	Ophthalmia neonatorum	6
Diphtheria	45	Paratyphoid fever	3
Dysentery	743	Pellagra	2
Erysipelas	3	Puerperal fever	6
Filariasis	3	Syphilis	130
Framboesia, tropical	2	Tetanus	4
Impetigo contagiosa	6	Tetanus, infantile	2
Influenza	270	Trachoma	2
Leprosy	3	Tuberculosis	329
Malaria	3,661	Typhoid fever	20
Measles	142	Whooping cough	69
Mumps	15		

VIRGIN ISLANDS

Notifiable diseases—November, 1932–January, 1933.—During the months of November and December, 1932, and January, 1933, cases of certain notifiable diseases were reported in the Virgin Islands as follows:

Disease	Cases			Disease	Cases		
	November, 1932	December, 1932	January, 1933		November, 1932	December, 1932	January, 1933
Chicken pox			2	Pellagra	1		
Dysentery		1		Sprue		1	
Filariasis	17	6	14	Syphilis	15	18	13
Gonorrhea	4		6	Tetanus			1
Leprosy	1			Tuberculosis	1	2	3
Malaria	61	253	193	Uncinariasis	1	1	1
Measles			1	Whooping cough	1	12	24

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

(NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for February 24, 1933, pp. 200–210. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued March 24, 1933, and thereafter, at least for the time being, in the issue published on the last Friday of each month.)

Cholera

Philippine Islands.—For the week ended February 18, 1933, 7 cases of cholera with 3 deaths were reported in Cebu Province, Philippine Islands, and 7 cases with 6 deaths in Leyte Province.

Plague

Hawaii Territory.—A rat taken January 25, 1933, in Makawao District, Island of Maui, has been proved positive for plague. A case of plague was reported February 1, 1933, in Hamakua district, Island of Hawaii, and a plague-infected rat was found in Hamakua district January 31, 1933. Makawao district is about 100 miles from Honolulu and Hamakua district is about 175 miles.

Smallpox

Egypt—Alexandria.—For the week ended February 11, 1933, 301 cases of smallpox with 52 deaths were reported at Alexandria, Egypt.

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UNITED STATES PUBLIC HEALTH SERVICE

HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst. Surg. Gen. R. C. WILLIAMS, *Chief of Division*

The PUBLIC HEALTH REPORTS are issued weekly by the United States Public Health Service through its Division of Sanitary Reports and Statistics, pursuant to acts of Congress approved February 15, 1893, and August 14, 1912.

They contain: (1) Current information of the prevalence and geographic distribution of preventable diseases in the United States in so far as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other communicable diseases throughout the world. (2) Articles relating to the cause, prevention, or control of disease. (3) Other pertinent information regarding sanitation and the conservation of public health.

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CONTENTS

PUBLIC HEALTH REPORTS

VOL. 48 MARCH 10, 1933 No. 10

THE OBJECTIVES IN PUBLIC HEALTH NURSING *

(EDITORIAL NOTE: Since public health nursing has assumed a definite and important place in modern public health programs, it would seem desirable that the objectives of public health nursing be outlined and the qualifications of the public health nurse be tentatively set as an approach to standardization. As of especial interest, therefore, to public health administrators and to those desiring to enlist their services in this specialized field of nursing, there are presented here two articles dealing with objectives and qualifications. These articles are published not with the suggestion of finality but rather as points of departure for future development based on experience and attainable ideals in this important field of public health work.)

Under the title of "Objectives," a terse statement of the goals in public health nursing has been prepared by the committee on field studies and administrative practice of the National Organization for Public Health Nursing.

The statement is a first effort toward outlining the range of public health nursing services in all its various aspects and is therefore only tentative. It is hoped that it will be used experimentally and discussed frankly.

In preparing these objectives, the committee on field studies and administrative practice hoped to fill several needs noted in field work. One of these is the need for a measuring rod for individual nurses that they may know to what extent they carry out a complete visit and a complete service. Staff nurses are therefore encouraged to review their daily work in the light of these objectives.

The objectives are of particular value in supplying supervisors and teachers of public health nursing with guides for analyzing work done and for assisting staff nurses and students.

From the community and organization standpoint there has long been a demand for such criteria as the objectives give. Health officers both State and local, have sought clarification as to the exact extent and nature of public health nursing and may find the objectives useful in planning and appraising their own services. Public health nurse executives have needed a check on the programs of their organizations. Members of boards and committees have sought help in studying the

* Reprinted from Public Health Nursing, September, 1931.

adequacy of their local services in relation to community needs. The public at large is interested in a better understanding of the part of public health nursing in the whole movement for better health.

State and national organizations look to the objectives for definite help in field studies, appraisals, and the maintenance of standards.

Therefore the use of these objectives as tentative guides is recommended with the hope that reports of the experience of those who use them will be sent to the National Organization for Public Health Nursing.

Definition[1] *of public health nursing: Public health nursing is an organized community service rendered by graduate nurses to the individual, family, and community. This service includes the interpretation and application of medical, sanitary, and social procedures for the correction of defects, the prevention of disease, and the promotion of health, and may include skilled care of the sick in their homes.*

GENERAL OBJECTIVES

The general objectives of all public health nursing services are:

1. To assist in educating individuals and families to protect their own health.
2. To assist in the adjustment of family and social conditions that affect health.
3. To assist in correlating all health and social programs for the welfare of the family and community.
4. To assist in educating the community to develop adequate public health facilities.

OBJECTIVES IN PUBLIC HEALTH NURSING IN RELATION TO SPECIAL PHASES OF THE COMMUNITY HEALTH PROGRAM

I. MATERNITY SERVICE

Definition: Maternity service includes nursing care given during pregnancy and delivery, and care given to mother and newborn baby after delivery.

The objectives of a maternity nursing service are:

1. To get in touch with all prospective mothers as early in pregnancy as possible.
2. To see that they are provided with both medical and nursing supervision throughout the maternity cycle.
3. To instruct mother and father in maternal hygiene [2] and infant care.
4. To instruct in the preparation for delivery.
5. To arrange or provide nursing assistance during delivery.
6. To provide or supervise adequate nursing care to mother and to newborn baby.
7. To secure physical examination of newborn baby.
8. To secure medical examination for the mother.

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[1] All definitions given are from Definition of Nursing Services, Public Health Nurse, October, 1929.

[2] Throughout these Objectives, "hygiene" implies the whole meaning of the term, *e. g.*, physical and mental hygiene.

II. INFANCY (under 1 year)

(*Instruction of the family is begun during the prenatal period.*)

The objectives of a public health nursing service during the period of infancy are:

1. To assist in securing medical supervision, including a physical examination for every child.
2. To assist in getting complete birth registration.
3. To instruct the mother in the importance of proper feeding with emphasis on breast feeding for infants.
4. To instruct the mother in the hygiene and daily régime of the child.
5. To assist in communicable-disease control by the recognition of early symptoms.
6. To assist in communicable-disease control by securing immunization.
7. To assist in securing the correction of defects.
8. To provide or supervise adequate nursing care for all sick infants.

III. PRESCHOOL (1 year of age and under 6)

The objectives of a public health nursing service for the preschool period are:

1. To assist in securing medical supervision, including a physical examination for every child.
2. To instruct the mother in the hygiene and daily regime of the child.
3. To assist in communicable-disease control by the recognition of early symptoms.
4. To assist in communicable-disease control by securing immunization.
5. To assist in securing the correction of defects.
6. To provide or supervise adequate nursing care to all sick children.

IV. SCHOOL AGE

In school health service, the nurse works with the teacher as well as with the physician and parents for the health of the child and is a connecting link between the school medical service and the home. This applies to both public and private schools.

The objectives of a public health nursing service to school age groups are:

1. To assist in communicable-disease control by the recognition of early symptoms and by securing immunization.
2. To assist the physician in medical inspection and in the routine periodic physical examination of every school child.
3. To assist in securing the correction of defects and in promoting health.
4. To assist in securing special examinations and such follow-up as is necessary.
5. To participate in the promotion of hygiene and sanitation of the school plant.
6. To assist in securing proper instruction of pupils and parents in the principles of healthy living.
7. To provide or supervise adequate nursing care to all sick children.

V. ADULT HEALTH SERVICE

The objectives of a public health nursing service to well adults are:

1. To assist in encouraging periodic health examinations.
2. To teach the fundamentals of personal hygiene.
3. To assist in the prevention and retardation of those diseases specific to adult life.

VI. MORBIDITY SERVICE

Definition: Morbidity Service, which is often called bedside nursing, is concerned primarily with the care of sick persons under or pending medical direction.

The objectives of a morbidity service are:

1. To assist in securing early diagnosis and adequate medical care.
2. To provide or supervise adequate nursing care for all patients ill at home.
3. To instruct some one in the home to give care.
4. To teach hygiene and the prevention of disease.
5. To assist in securing any needed special care for the following types of patients:
   Orthopedic, arthritic, heart, diabetic, cancer, etc.
6. To assist in the rehabilitation of the patient.

VII. COMMUNICABLE DISEASE SERVICE

The objectives of a communicable disease service are:

1. To assist in securing complete reporting of communicable disease.
2. To assist in securing medical supervision.
3. To secure or supervise nursing care.
4. To prevent the spread of disease through the teaching of isolation, quarantine, and immunization.
5. To emphasize the importance of convalescent care to prevent sequelae.
6. To teach hygiene as a means of general disease prevention.

VIII. TUBERCULOSIS SERVICE

The objectives of a tuberculosis service are:

1. To assist in finding all cases of tuberculosis and all contacts.
2. To assist in arranging for medical supervision and early diagnosis.
3. To assist in the securing of complete reporting of all cases of tuberculosis.
4. To secure and supervise nursing care in the homes.
5. To assist in securing institutional care.
6. To teach personal hygiene to the patient.
7. To secure examination, provide continuous supervision, and teach personal hygiene to all contacts.
8. To assist in providing post-sanatorium care and supervision.
9. To assist in providing the means of rehabilitation.

IX. SYPHILIS AND GONORRHEA

The objectives of a public health nursing service in the control of syphilis and gonorrhea are:

1. To assist in finding all cases of syphilis and gonorrhea and all contacts.
2. To assist in providing continued medical and nursing treatment and follow-up care.
3. To assist in securing complete reporting of all cases of syphilis and gonorrhea.
4. To instruct the family in personal hygiene.

X. MENTAL HYGIENE SERVICE

Mental hygiene as part of a public health nursing program ramifies through all of the other phases of the program and is inseparable from them.

The objectives of a public health nursing service in mental hygiene are:

1. To make more productive all of the nurse's contacts with individuals and families through her better understanding of human psychology, and teaching methods.

2. To increase her awareness of the significance of variations of human behavior so that she may make more intelligent use of mental hygiene resources.
3. To equip the nurse to assist in the care of the mentally sick in their own homes.

XI. ORTHOPEDIC SERVICE

The objectives of a public health nursing program for orthopedic conditions are:

1. To find all cases with orthopedic defects, particularly the preschool child, in an incipient stage in order to prevent deformity.
2. To secure medical care and treatment.
3. To give nursing care during the acute stage as necessary and to instruct the family under doctor's orders in order to prevent the development of deformity.
4. To give after-care especially to poliomyelitis cases and to teach muscle exercises to the patient and to some member of the family.
5. To aid in securing the necessary treatment for physical rehabilitation.
6. To secure education in vocational guidance.

XII. INDUSTRIAL NURSING SERVICE

Definition: Industrial nursing service includes activities in behalf of the health of employees of commercial and industrial concerns, initiated within the industry. It may be given to employees only within the establishment, or it may be given outside the establishment to employees or to employees and their families.

The objectives of an industrial nursing service are:

1. To assist in securing medical examination of incoming persons in industry.
2. To assist in securing periodic medical examination of all employees.
3. To assist in the promotion of proper hygiene and sanitation of the plant.
4. To assist in teaching hygiene with emphasis on health promotion.
5. To assist in the prevention and treatment of accidents.
6. To secure medical and nursing follow-up care of employees.
7. To assist in securing in the plant and in the home an environment which will enhance the health of the worker.

MINIMUM QUALIFICATIONS FOR THOSE APPOINTED TO POSITIONS IN PUBLIC HEALTH NURSING*

Prepared by The Committee on Education of National Organization for Public Health Nursing. Indorsed by The Public Health Nursing Section, The Committee on Training and Personnel of the Committee on Research and Standards of the American Public Health Association, March, 1931

INTRODUCTION

The following definitions of desirable minimum qualifications for persons appointed to public health nursing positions are offered in the belief that they can be met quite generally by the year 1935. It is obvious that a higher level of requirements has already been reached

*Reprinted from Public Health Nursing, May, 1931.

in certain official and volunteer health organizations, particularly in the field of experience with communicable disease, and for supervisors in the matter of academic degrees. Minimum qualifications will be advanced with the years as the quality of nursing education and practical training is generally improved. Those offered here must be considered as representing a stage in development and progress.

STAFF POSITIONS

I. FOR THE NURSE ON A STAFF PROVIDING WELL-QUALIFIED NURSE SUPERVISION

(*a*) At least high-school graduation or its educational equivalent as determined by the State Department of Education.

(*b*) Fundamental nursing education, namely—

Graduation from an accredited school for nurses connected with a general hospital having a daily average of 50 patients or more. Curriculum should include practical experience in caring for men, women, and children, together with theoretical and practical instruction in medical, surgical, obstetrical, and pediatric nursing. Such experience may be secured in one or more hospitals.

It is highly desirable, in addition, that preference be given the public health nurse who has had training in communicable diseases (including tuberculosis and venereal diseases); psychiatric diseases and mental hygiene; and such specialties as diseases of the eye, ear, nose, and throat; experience in out-patient clinics; and a two months' affiliation with some well-organized community health agency.

These services may be given in the school, as an affiliation with another school of nursing, or as a postgraduate course.

(*c*) State registration.

For those nurses not meeting the educational and professional requirements of the above outline, occasional exceptions may be made, if professional training or experience has developed a wisdom and judgment which is valuable in the public health nursing field.

II. FOR THE NURSE WORKING ALONE, I. E., WITHOUT QUALIFIED NURSE SUPERVISION

(*a*), (*b*), and (*c*), as above.

(*d*) In addition it is desirable that she have had at least six weeks' instruction in public health nursing, preferably in one of the recognized public health nursing courses and one year's experience under adequate supervision, *or* two years' experience under adequate supervision, *or* a public health nursing course indorsed by the N. O. P. H. N.

Occasional exceptions may be made for those not meeting this academic and fundamental nursing standard, but such nurses should have proved their ability before being appointed for positions where they work alone, and should be expected to meet requirement (*d*).

It is of primary importance that every public health nurse have suitable personal qualifications.

SUPERVISORY POSITIONS

I. SUPERVISORS

It is expected that those appointed to positions of supervisory rank have the equivalent of the educational and professional background described as a standard for the staff nurse, namely—

(*a*) At least high-school graduation or its educational equivalent as determined by the State Department of Education.

(*b*) Fundamental nursing education, namely—

Graduation from an accredited school of nurses connected with a general hospital having a daily average of 50 patients or more. Curriculum should include practical experience in caring for men, women, and children, together with theoretical and practical instruction in medical, surgical, obstetrical, and pediatric nursing. Such experience may be secured in one or more hospitals.

It is highly desirable, in addition, that preference be given the public health nurse who has had training in communicable diseases (including tuberculosis and venereal diseases); psychiatric diseases and mental hygiene; and such specialties as diseases of the eye, ear, nose, and throat; experience in out-patient clinics; and a two months' affiliation with some well-organized community health agency.

These services may be given in the school, as an affiliation with another school of nursing, or as a postgraduate course.

(*c*) State registration.

In addition she should have had the following:

(*d*) At least one year's supervised experience in a well-organized public health nursing agency.

(*e*) A public health nursing course indorsed by the N. O. P. H. N.

For those nurses not meeting the educational and professional requirements of the above outline, occasional exceptions may be made if professional training or experience has developed a wisdom and judgment which is valuable in the public health nursing field.

In making promotions and new appointments to supervisory positions, preference should be given to those with certain personal qualifications which, though difficult to measure, are vital to her work, such as special technical skill in the field she supervises, ability to impart information, to win confidence of staff, and to inspire voluntary requests for help; ability to delegate work with a fair balance in responsibilities assigned, and to stimulate initiative on the part of staff; ability to correlate work with that of other agencies in related health and social fields; breadth of vision covering both the aims of her profession and the work of her organization in relation to a unified community health program, with the initiative and imagination for developing new work.

II. EDUCATIONAL DIRECTORS

The educational director would need all these general qualifications together with advanced academic preparation, including educational subjects, if possible. It is especially important that in addition to proved teaching ability, she show evidence of imagination so that she can fit her individual and group teaching to the immediate needs of her staff and to the broader developments in the community's health program. She, as well as the director, must have the vision to be a few steps ahead of present practice.

III. DIRECTORS

The highest standard of qualifications should be required of an executive director. She should have more than the minimum education required of her staff. It is desirable that she have an advanced academic preparation, preferably a college degree.

The director's experience should include at least two years in a public health nursing service, emphasizing family service. In addition, she should have had experience as a supervisor and, when possible, as an assistant executive director. She should have sound administrative ability to organize and direct the work.

Such a background would prove her teaching ability, her knowledge of technical skills, and her ability to cope with larger problems of organization and administration. Her distinctive contribution should be the ability to interpret the needs of her organization and of the community to her committee and board members. and to be a leader in community health developments.

COURT DECISION RELATING TO PUBLIC HEALTH

Creation by city board of education of position of nurse and teacher of health and physical education upheld.—(Kentucky Court of Appeals; Board of Education of Bowling Green *v.* Simmons, 53 S. W. (2d) 940; decided Oct. 25, 1932.) The board of education of the city of Bowling Green, by one section of the statutes, was empowered "to expend all moneys in the interest of public schools of the city." Another section gave the board authority to establish and maintain a public-school library and to purchase textbooks for indigent children out of any funds coming into its hands, and also to "otherwise expend such moneys in the interest of the public schools." The board made an order creating, and fixing the salary of, the position of nurse and teacher of health and physical education, and made an appointment to such position. Certain taxpayers sought to have the action of the board declared void and to enjoin the payment of the school funds for the appointee's services. The judgment of the lower court was adverse to the board and an appeal was taken to the court of appeals.

The board, in its order, cited a certain section as being the statutory authority for its action. The section cited did not confer such authority, but the appellate court held that, if other sections conferred the required power, a reference to the wrong section in no wise affected the validity of the order.

After considering the pertinent constitutional and statutory provisions bearing upon the matter, the court of appeals concluded that the board had the power to create the position and make the appropriation if, in its sound discretion, the employment of a nurse and teacher of health and physical education was for the interest of the public schools of the city. Concerning the ultimate question as to whether the creation of the position and the employment of a person therein were to the interest of the public schools in the sense in which

the phrase was used in the statutes, the court reached the conclusion that the board's action in the matter was, in fact and in law, for the interest of the schools.

The taxpayers contended that a certain section of the statutes, which made mention of school inspection by county health officers, afforded ample and complete health service to the public schools of the city and that it had to be looked to for the service contemplated by the order of the board of education. The court held, however, that such statutory provision could not be considered as a limitation of, or a substitute for, the power of the board to appropriate the school funds as authorized.

Concerning the contention that the person appointed by the board did not hold the required credentials authorizing her to teach in the public schools, the court decided that the statutes governing a regular teacher's qualifications were not applicable to the position of nurse and teacher of health and physical education.

The judgment of the lower court was reversed.

DEATHS DURING WEEK ENDED FEBRUARY 18, 1933

[From the Weekly Health Index issued by the Bureau of the Census, Department of Commerce]

	Week ended Feb 18, 1933	Corresponding week, 1932
Data from 85 large cities of the United States		
Total deaths	8,855	8,758
Deaths per 1,000 population, annual basis	12.4	12.5
Deaths under 1 year of age	633	604
Deaths under 1 year of age per 1,000 estimated live births [1]	55	54
Deaths per 1,000 population, annual basis, first 7 weeks of year	12.7	12.0
Data from industrial insurance companies		
Policies in force	69,031,830	74,003,681
Number of death claims	12,767	16,055
Death claims per 1,000 policies in force, annual rate	9.6	11.3
Death claims per 1,000 policies, first 7 weeks of year, annual rate	11.5	9.9

[1] 1933, 81 cities, 1932, 78 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks ended February 25, 1933, and February 27, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended February 25, 1933, and February 27, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Feb. 25, 1933	Week ended Feb. 27, 1932	Week ended Feb. 25, 1933	Week ended Feb. 27, 1932	Week ended Feb. 25, 1933	Week ended Feb. 27, 1932	Week ended Feb. 25, 1933	Week ended Feb. 27, 1932
New England States:								
Maine	2	3	114	19	4	481	0	0
New Hampshire		1				16	0	0
Vermont	1				1	89	0	0
Massachusetts	25	58	10	12	282	369	0	2
Rhode Island		2	2		1	670	0	0
Connecticut	6	8	24	24	180	301	1	3
Middle Atlantic States:								
New York	50	143	[1] 45	[1] 322	2,985	1,908	3	9
New Jersey	15	47	38	99	935	189	1	4
Pennsylvania	61	198			1,143	2,619	3	9
East North Central States:								
Ohio	33	67	228	488	625	1,157	0	0
Indiana	34	57	68	150	23	76	0	12
Illinois [2]	61	59	175	219	237	150	18	11
Michigan	25	23	17	135	1,004	539	1	1
Wisconsin	5	16	197	767	393	318	1	2
West North Central States:								
Minnesota	2	13	3	2	1,135	124	1	1
Iowa	9	13		22		7	2	0
Missouri	29	38	20	27	202		5	1
North Dakota	8	14	10		81	77	0	0
South Dakota	3	6	17	216	10	62	1	1
Nebraska	8	9	15	7	13	26	0	1
Kansas	9	15	9	28	222	192	0	3
South Atlantic States:								
Delaware	4	8			6	2	1	0
Maryland [3]	11	30	86	82	7	38	0	1
District of Columbia	5	12	5	3	2	2	0	1
Virginia [2]	16				288		3	
West Virginia	13	20	40	124	446	487	0	0
North Carolina	18	21	143	63	502	294	3	2
South Carolina	8	8	1,464	1,037	167	90	0	0
Georgia [2]	6	10	400	92	102	6	0	2
Florida [2]	14	14	384		15	3	1	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended February 25, 1933, and February 27, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Feb. 25, 1933	Week ended Feb. 27, 1932	Week ended Feb. 25, 1933	Week ended Feb. 27, 1932	Week ended Feb. 25, 1933	Week ended Feb. 27, 1932	Week ended Feb 25, 1933	Week ended Feb 27, 1932
East South Central States:								
Kentucky	12	17	82	435	22	85	3	7
Tennessee	8	27	81	335	31	73	3	2
Alabama [2]	18	20	123	83	20		0	0
Mississippi	9	14					2	0
West South Central States:								
Arkansas	10	13	70	145	68	2	0	0
Louisiana	22	29	7	7	43	11	2	1
Oklahoma [4]	17	30	154	1,606	23	31	3	7
Texas [2]	55	45	251	251	521	28	1	1
Mountain States:								
Montana		1	99	1,867	105	56	0	0
Idaho			5	1	92		0	1
Wyoming					3		0	0
Colorado	4	3	53		7	69	3	2
New Mexico	10	13	5	8	3	60	0	1
Arizona	4	5	3	40	17	2	1	0
Utah [3]	2			22	3		0	0
Pacific States:								
Washington	3	2	2	8	31	583	0	1
Oregon	4	1	74	323	100	99	0	0
California	39	68	114	236	719	420	1	5
Total	698	1,201	4,637	9,305	12,848	11,841	64	94

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Feb. 25, 1933	Week ended Feb. 27, 1932	Week ended Feb. 25, 1933	Week ended Feb. 27, 1932	Week ended Feb. 25, 1933	Week ended Feb. 27, 1932	Week ended Feb. 25, 1933	Week ended Feb. 27, 1932
New England States:								
Maine	0	0	36	23	0	0	2	1
New Hampshire	0	0	51	34	0	0	0	0
Vermont	0	0	15	20	1	20	2	3
Massachusetts	0	0	371	499	0	0	0	1
Rhode Island	0	0	36	57	0	0	0	0
Connecticut	0	1	137	129	0	3	0	1
Middle Atlantic States:								
New York	2	10	882	1,520	0	3	5	9
New Jersey	0	0	314	265	0	0	2	1
Pennsylvania	0	0	843	883	0	0	3	13
East North Central States:								
Ohio	0	0	750	611	9	41	2	5
Indiana	0	0	170	183	4	13	0	8
Illinois [2]	2	3	484	411	4	16	6	10
Michigan	1	1	530	441	3	3	3	7
Wisconsin	2	1	123	147	16	10	2	1
West North Central States:								
Minnesota	0	1	89	150	0	3	3	2
Iowa	0	1	62	57	37	18	1	1
Missouri	0	0	133	82	0	5	1	1
North Dakota	0	0	15	19	3	8	0	0
South Dakota	0	0	10	15	0	14	0	0
Nebraska	1	0	25	54	0	8	0	1
Kansas	0	0	65	95	0	2	1	2
South Atlantic States:								
Delaware	0	0	4	9	0	0	1	1
Maryland [3]	0	0	122	147	0	0	7	6
District of Columbia	0	0	12	22	0	0	0	1
Virginia [2]	0		45		0		4	
West Virginia	0	0	31	36	0	0	7	4
North Carolina	0	0	36	37	0	5	6	4
South Carolina	1	1	3	11	0	0	1	9
Georgia [2]	0	0	9	14	0	0	1	11
Florida [2]	0	1	7	5	0	1	4	3

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended February 25, 1933, and February 27, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Feb. 25, 1933	Week ended Feb. 27, 1932	Week ended Feb. 25, 1933	Week ended Feb. 27, 1932	Week ended Feb. 25, 1933	Week ended Feb. 27, 1932	Week ended Feb. 25, 1933	Week ended Feb. 27, 1932
East South Central States:								
Kentucky	0	2	38	112	0	4	3	11
Tennessee	1	0	47	33	0	22	2	9
Alabama [2]	0	0	10	32	14	3	3	6
Mississippi	0	0	8	8	3	36	2	7
West South Central States:								
Arkansas	0	0	15	32	16	11	3	2
Louisiana	0	0	8	15	0	11	17	20
Oklahoma [4]	0	0	22	36	0	37	4	1
Texas [2]	0	0	40	59	44	7	3	4
Mountain States:								
Montana	0	1	19	28	0	1	4	1
Idaho	0	0	0	3	14	0	0	0
Wyoming	0	0	5	11	0	0	0	0
Colorado	0	0	39	29	0	1	0	0
New Mexico	0	1	12	8	0	0	1	0
Arizona	0	1	17	4	0	0	0	0
Utah [3]	0	0	11	2	0	0	0	0
Pacific States:								
Washington	1	1	58	25	7	16	1	2
Oregon	0	0	17	24	2	10	3	3
California	0	8	196	151	44	15	5	8
Total	11	29	5,972	6,588	221	347	115	180

[1] New York City only.
[2] Typhus fever, week ended Feb. 25, 1933, 14 cases: 1 case in Illinois, 2 cases in Virginia, 4 cases in Georgia 1 case in Florida, 3 cases in Alabama, and 3 cases in Texas.
[3] Week ended Friday.
[4] Figures for 1933 are exclusive of Oklahoma City and Tulsa and for 1932 are exclusive of Tulsa only.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week:

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
January, 1933										
Arizona		21	135		8		3	44	1	1
Georgia	1	50	4,579	63	13	20	1	56		20
Idaho		17	21		150		0	50	54	
Illinois	72	251	811	3	562	1	5	2,066	40	16
Louisiana	6	85	1,548	35	52	14	2	51	16	28
Michigan	9	93	495	2	1,625		0	1,598	2	11
Montana		19	8,222		791		0	72	3	2
North Carolina	8	91	5,259		1,219	22	1	223	4	17
North Dakota		16	10,114		418		6	55	4	
Oklahoma [1]	18	86	8,669	17	1		1	120	29	7
Texas	9	537	8,623	123		4	0	328		37
Virginia	14	94	17,565		873	6	2	238	0	26
West Virginia	2	60	4,332		256		1	159		17

[1] Exclusive of Oklahoma City and Tulsa.

January, 1933

Disease and State	Cases
Botulism:	
Montana	3
Chicken pox:	
Arizona	90
Georgia	100
Idaho	53
Illinois	1,955
Louisiana	96
Michigan	2,060
Montana	186
North Carolina	639
North Dakota	54
Oklahoma [1]	77
Virginia	365
West Virginia	251
Diarrhea and dysentery:	
Virginia	42
Dysentery:	
Georgia	7
Illinois (bacillary)	4
Louisiana	2
Montana	1
Oklahoma [1]	1
German measles:	
Illinois	20
Montana	9
North Carolina	10
North Dakota	9
Hookworm disease:	
Louisiana	27
Impetigo contagiosa:	
Illinois	1
Montana	17
Lead poisoning:	
Illinois	10
Lethargic encephalitis:	
Georgia	2
Illinois	6
Louisiana	1
Michigan	4
North Dakota	4
Texas	1
Ludwig's angina:	
Illinois	1

Disease and State	Cases
Mumps:	
Arizona	24
Georgia	77
Idaho	28
Illinois	237
Michigan	722
Montana	10
North Dakota	8
Oklahoma [1]	38
West Virginia	2
Ophthalmia neonatorum:	
Illinois	7
Paratyphoid fever:	
Virginia	2
Puerperal septicemia:	
Illinois	11
Rabies in animals:	
Illinois	14
Louisiana	8
Rabies in man:	
Louisiana	2
Scabies:	
Montana	2
Oklahoma [1]	1
Septic sore throat:	
Georgia	27
Illinois	18
Louisiana	9
Michigan	15
Montana	2
North Carolina	12
Oklahoma [1]	16
Virginia	25
Tetanus:	
Illinois	3
Louisiana	1
Oklahoma [1]	1
Virginia	3
Trachoma:	
Arizona	26
Illinois	4
North Dakota	2
Oklahoma [1]	3
Trichinosis:	
Illinois	3

Disease and State	Cases
Tularaemia:	
Illinois	45
Louisiana	3
Michigan	1
North Carolina	4
Oklahoma [1]	1
Virginia	14
Typhus fever:	
Georgia	9
Louisiana	1
North Carolina	1
Virginia	1
Undulant fever:	
Arizona	1
Georgia	1
Illinois	3
Louisiana	2
Michigan	5
Montana	2
North Carolina	1
North Dakota	1
Oklahoma [1]	1
Virginia	1
Vincent's angina:	
Illinois	42
Montana	3
Vincent infection:	
North Dakota	20
Whooping cough:	
Arizona	17
Georgia	98
Idaho	33
Illinois	304
Louisiana	33
Michigan	1,051
Montana	2
North Carolina	459
North Dakota	16
Oklahoma [1]	53
Virginia	244
West Virginia	188

[1] Exclusive of Oklahoma City and Tulsa.

WEEKLY REPORTS FROM CITIES

City reports for week ended February 18, 1933

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	0		0	3	0	3	0	1	1	5	35
New Hampshire:											
Concord	0		1	0	1	0	0	0	0	0	14
Nashua	0		0	1	0	0	0	0	0	0	
Vermont:											
Barre	0		0	0	0	0	0	1	0	0	2
Burlington	0		0	1	0	0	0	0	0	0	3
Massachusetts:											
Boston	6	1	1	50	27	103	0	4	1	72	197
Fall River	0	1	0	1	3	11	0	0	0	6	30
Springfield	0	4	0	0	1	4	0	2	1	12	35
Worcester	0		0	2	8	9	0	2	0	5	59
Rhode Island:											
Pawtucket	0		0	0	0	0	0	0	0	0	19
Providence	2	5	1	0	4	20	0	1	0	0	64
Connecticut:											
Bridgeport	0	5	1	18	1	3	0	0	0	0	32
Hartford	0	4	0	1	0	5	0	3	0	0	30
New Haven	0		0	0	6	7	0	0	0	12	35
New York:											
Buffalo	9		2	5	25	46	0	8	0	52	153
New York	50	41	22	1,050	177	285	0	97	4	74	1,624
Rochester	3		0	1	6	32	0	0	0	5	81
Syracuse	0		3	1	3	22	0	0	0	6	63

City reports for week ended February 18, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
New Jersey:											
Camden	2	------	0	0	1	15	0	1	0	0	31
Newark	2	27	1	337	6	26	0	7	0	17	120
Trenton	1	7	0	7	2	17	0	4	1	5	35
Pennsylvania:											
Philadelphia	1	15	10	64	45	140	0	26	1	3	524
Pittsburgh	4	7	4	2	14	54	0	4	0	10	159
Reading	2	------	0	72	1	14	0	2	0	6	17
Scranton	0	------	------	0	------	31	0	------	0	2	------
Ohio											
Cincinnati	3	------	7	4	17	19	0	10	0	6	140
Cleveland	0	145	4	2	10	149	0	15	0	35	176
Columbus	3	------	0	103	2	12	0	2	0	0	73
Toledo	3	2	1	185	6	40	0	4	0	5	69
Indiana:											
Fort Wayne	5	------	1	0	4	2	0	0	1	0	35
Indianapolis	5	------	2	19	14	14	0	2	0	0	------
South Bend	0	------	0	1	1	14	0	0	0	13	12
Terre Haute	0	------	0	0	2	6	0	0	0	0	11
Illinois:											
Chicago	7	12	8	237	92	227	0	45	1	26	839
Springfield	2	------	0	0	1	1	0	0	0	0	20
Michigan:											
Detroit	15	8	3	259	24	144	0	15	0	119	286
Flint	3	6	1	1	7	9	0	3	0	7	34
Grand Rapids	0	------	0	1	4	14	0	0	0	23	23
Wisconsin:											
Kenosha	0	------	0	0	0	2	6	0	0	8	9
Madison	0	------	------	68	------	1	0	------	0	0	------
Milwaukee	0	2	2	2	7	20	0	5	0	50	130
Racine	0	------	0	4	0	5	0	0	0	10	9
Superior	0	------	0	0	1	0	0	0	0	7	7
Minnesota:											
Duluth	0	------	0	10	1	2	0	3	0	37	20
Minneapolis	0	------	1	1,050	7	22	0	4	1	17	106
St. Paul	0	2	2	170	5	16	1	2	3	44	60
Iowa:											
Des Moines	2	------	------	0	------	2	0	------	0	0	22
Sioux City	1	------	------	0	------	2	0	------	0	2	------
Waterloo	1	------	------	0	------	0	0	------	0	0	------
Missouri:											
Kansas City	1	------	1	116	22	29	0	9	0	3	110
St. Joseph	5	------	0	5	3	2	0	0	0	1	7
St. Louis	19	2	2	3	9	20	0	10	1	3	238
North Dakota:											
Fargo	0	------	0	0	0	4	0	0	0	2	5
Grand Forks	0	------	0	0	0	0	0	0	0	0	------
South Dakota:											
Aberdeen	0	------	------	0	------	1	1	------	0	0	------
Nebraska:											
Omaha	9	------	0	10	6	11	0	4	0	0	50
Kansas:											
Topeka	0	------	0	34	2	0	0	0	0	1	9
Wichita	0	------	0	0	4	2	0	1	0	1	41
Delaware:											
Wilmington	3	------	0	1	3	4	0	1	0	0	28
Maryland:											
Baltimore	3	18	2	2	23	45	0	16	0	7	237
Cumberland	1	------	0	0	1	1	0	0	0	0	14
Frederick	0	------	0	0	0	2	0	1	0	0	7
District of Col.:											
Washington	7	3	2	5	17	11	0	11	0	2	146
Virginia:											
Lynchburg	0	------	1	0	0	2	0	1	0	3	8
Richmond	0	------	3	2	6	3	0	4	0	0	61
Roanoke	1	------	0	179	1	4	0	0	0	0	16
West Virginia:											
Charleston	0	3	0	0	2	2	0	0	1	1	9
Huntington	1	------	------	46	------	2	0	------	1	0	------
Wheeling	0	1	0	44	3	3	0	1	0	6	15
North Carolina:											
Raleigh	------	------	------	------	------	------	------	------	------	------	------
Wilmington	0	------	0	49	1	1	0	0	0	2	12
Winston-Salem	1	1	0	5	6	1	0	4	1	5	29

City reports for week ended February 18, 1933—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
South Carolina:											
Charleston	0	85	0	0	2	1	0	5	1	0	34
Columbia	------	------	------	------	------	------	------	------	------	------	------
Greenville	0	------	0	10	0	0	0	0	0	0	------
Georgia:											
Atlanta	4	24	1	2	10	0	0	6	3	22	101
Brunswick	0	------	0	0	0	0	0	1	0	0	3
Savannah	1	194	3	1	0	0	0	2	0	0	28
Florida:											
Miami	0	14	2	0	1	1	0	1	1	2	26
Tampa	0	3	3	0	2	1	0	0	1	10	25
Kentucky:											
Ashland	0	5	0	0	0	0	0	0	0	1	0
Lexington	0	------	0	5	0	0	0	2	0	0	15
Louisville	3	4	2	0	15	12	0	4	0	0	95
Tennessee:											
Memphis	1	------	8	2	9	10	0	5	0	4	96
Nashville	0	------	3	0	6	1	0	7	0	2	54
Alabama:											
Birmingham	4	18	2	0	6	3	0	14	0	18	85
Mobile	1	1	3	1	0	5	0	1	0	0	27
Montgomery	1	4	------	0	------	0	0	------	0	0	------
Arkansas:											
Fort Smith	0	------	------	0	------	0	0	------	0	0	------
Little Rock	1	------	2	0	3	1	0	2	2	0	8
Louisiana:											
New Orleans	10	11	5	0	10	1	1	14	0	10	161
Shreveport	1	------	0	0	2	0	0	0	0	0	25
Oklahoma:											
Oklahoma City	3	------	0	0	9	7	0	0	0	0	44
Tulsa	2	------	0	0	1	3	1	0	1	0	1
Texas:											
Dallas	7	7	7	47	10	5	1	1	0	1	69
Fort Worth	1	------	1	144	7	7	3	1	0	0	46
Galveston	2	------	0	3	1	4	0	5	0	0	19
Houston	6	------	0	50	11	3	0	2	0	0	73
San Antonio	4	------	3	6	15	1	0	6	0	0	71
Montana:											
Billings	0	------	0	0	0	0	0	0	0	0	9
Great Falls	0	------	1	11	4	1	0	0	0	1	8
Helena	0	------	0	0	0	0	0	0	0	0	5
Missoula	0	------	0	0	1	5	0	0	0	0	5
Idaho:											
Boise	------	------	------	------	------	------	------	------	------	------	------
Colorado:											
Denver	4	68	4	2	6	14	0	2	0	0	82
Pueblo	0	------	0	1	3	0	0	2	0	2	11
New Mexico:											
Albuquerque	1	------	0	0	2	1	0	5	0	0	16
Arizona:											
Phoenix	0	------	0	1	0	5	0	8	0	0	------
Utah:											
Salt Lake City	0	------	1	0	2	7	0	1	0	11	24
Nevada:											
Reno	0	1	0	0	0	0	0	0	0	0	5
Washington:											
Seattle	1	------	------	1	------	7	0	------	0	7	------
Spokane	0	------	------	2	------	2	0	------	0	0	------
Tacoma	0	------	0	0	2	2	0	0	0	0	19
Oregon:											
Portland	0	5	3	3	6	9	1	2	0	0	76
Salem	0	6	------	50	------	0	0	------	0	0	------
California:											
Los Angeles	25	29	6	185	18	76	23	35	1	25	310
Sacramento	0	3	1	2	5	1	0	0	3	9	25
San Francisco	1	23	2	1	17	8	0	14	0	64	195

City reports for week ended February 18, 1933—Continued

State and city	Meningococcus meningitis		Poliomyelitis cases	State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
New York:				Maryland:			
New York	4	1	0	Baltimore	1	1	0
Pennsylvania:				District of Columbia:			
Philadelphia	5	0	0	Washington	0	1	0
Pittsburgh	1	1	0				
Reading	1	1	0	Tennessee:			
Indiana:				Memphis	3	0	0
Indianapolis	3	0	1				
Illinois:				Louisiana:			
Chicago	13	6	0	New Orleans	1	1	0
Michigan:				Oklahoma:			
Detroit	0	1	1	Tulsa	0	0	1
Minnesota:				Utah:			
Duluth	1	0	0	Salt Lake City	1	0	0
Minneapolis	1	1	0				
Missouri:				California:			
St. Louis	1	0	0	Los Angeles	0	2	1
Nebraska:				San Francisco	2	1	0
Omaha	1	0	0				

Lethargic encephalitis.—Cases: Columbus, 1; Baltimore, 1; San Francisco, 1.
Pellagra.—Cases: Savannah, 1; Birmingham, 2; Montgomery, 1; New Orleans, 1.
Typhus fever.—Cases: Savannah, 1; Los Angeles, 1. Deaths: Los Angeles, 1.

FOREIGN AND INSULAR

INFLUENZA IN THE BRITISH ISLES AND EUROPE

England and Wales.—For the week ended February 11, 1933, 1,306 deaths from influenza were registered in the great towns of England and Wales, as compared with 1,911 deaths for the preceding week.

Scotland.—In the principal towns of Scotland, 44 deaths from influenza were reported for the week ended February 18, 1933, and 70 deaths for the week ended February 11. (Earlier reports will be found in the tables on p. 241 of the Public Health Reports of Mar. 3, 1933.)

Irish Free State.—An epidemic of influenza of a mild type was reported in Dublin County Borough between January 21 and February 4, 1933. Influenza was also reported in Counties Cavan and Westmeath.

Northern Ireland.—For the week ended January 28, 1933, 79 deaths from influenza and pneumonia (combined) were registered in Belfast. The general death rates in Belfast were as follows: Week ended January 28, 1933, 35.5 per 1,000 population; week ended February 4, 37.2; week ended February 11, 30 per 1,000.

Czechoslovakia.—During January, 1933, 6,011 cases of influenza were reported in Moravia and Silesia, 12,645 cases in Bohemia, and 1,045 cases in Carpathian Ruthenia.

Denmark—Copenhagen.—For the three weeks ended February 4, 1933, influenza was reported at Copenhagen as follows: 7,625, 11,261, and 7,184 cases, respectively.

Finland.—During the first two weeks of January, 1,391 cases of influenza were reported in Finland, including 347 cases at Helsingfors.

France—Paris.—During the three 10-day periods ended January 20, 1933, deaths from influenza and pneumonia at Paris were, respectively, 119, 265, and 324. Deaths from all causes were 1,187, 1,417, and 1,595, respectively.

Germany.—The number of cases of influenza among insured persons in Berlin, Cologne, Leipzig, and Mannheim increased from 3,833 cases for the week ended January 28, 1933, to 8,830 cases for the week ended February 4, 1933. A decrease in the number of new cases of influenza was recorded at Bremen, Brunswick, and Hamburg. The general sickness rate among insured persons in Germany was said to be low.

Hungary.—Cases of influenza were reported in Hungary as follows: Week ended January 28, 1933, 147 cases; week ended February 4, 208; week ended February 11, 452 cases.

Norway—Oslo.—The number of cases of influenza reported at Oslo during the first four weeks of the year were respectively, 221, 561, 1,017, and 1,171.

Switzerland.—For the week ended February 4, 1933, 2,654 cases of influenza were reported at Basle as compared with 664 cases for the preceding week. At Zurich, 1,143 cases of influenza were reported for the week ended February 4 as compared with 534 cases for the preceding week.

CANADA

Provinces—Communicable diseases—Week ended February 11, 1933.—The Department of Pensions and National Health of Canada reports cases of certain communicable diseases for the week ended February 11, 1933, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis					2		1	2		5
Chicken pox		1		132	274	50	20	6	35	518
Diphtheria		2	3	33	20	5	4	3		70
Erysipelas		1			2			1	2	6
Influenza	10	103		2	413	6	2		35	571
Lethargic encephalitis					1					1
Measles		4	7	94	604	1	2	1		713
Mumps					162	23			16	201
Pneumonia (all forms)	3	3			12		8		3	29
Poliomyelitis				2						2
Scarlet fever		3	5	65	74	18	34	1	11	211
Smallpox							22			22
Trachoma							1		11	12
Tuberculosis		1	5	90	45	13	7		12	173
Typhoid fever				24	2	4			2	32
Whooping cough		16		188	118	32	18	2	19	393

Ontario Province—Communicable diseases—Four weeks ended January 28, 1933.—The Department of Health of the Privince of Ontario, Canada, reports certain communicable diseases for the four weeks ended January 28, 1933, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Actinomycosis	1		Pneumonia		237
Cerebrospinal meningitis	9	4	Poliomyelitis	2	
Chicken pox	1,284		Puerperal septicemia	1	
Diphtheria	80	3	Scarlet fever	345	1
Dysentery	1		Septic sore throat	3	
Erysipelas	10	1	Smallpox	4	
German measles	12		Syphilis	180	
Gonorrhea	240		Tetanus	1	
Influenza	2,756	62	Trench mouth	1	
Lethargic encephalitis	2		Tuberculosis	170	38
Measles	1,935	6	Typhoid fever	26	1
Mumps	764		Undulant fever	8	
Paratyphoid fever	1		Whooping cough	440	2

JAMAICA

Communicable diseases—Four weeks ended January 28, 1933.—During the four weeks ended January 28, 1933, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island of Jamaica outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis		2	Leprosy		2
Chicken pox	1	7	Puerperal fever		3
Diphtheria		1	Scarlet fever		1
Dysentery		1	Tuberculosis	18	76
Erysipelas		2	Typhoid fever	11	61

YUGOSLAVIA

Communicable diseases—January, 1933.—During the month of January, 1933, certain communicable diseases were reported in Yugoslavia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	37	6	Poliomyelitis	5	1
Cerebrospinal meningitis	12	6	Scarlet fever	292	15
Diphtheria and croup	1,041	166	Sepsis	9	4
Dysentery	205	4	Tetanus	16	5
Erysipelas	162	9	Typhoid fever	543	77
Measles	319	12	Typhus fever	35	7
Paratyphoid fever	13	3			

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

(NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for February 24, 1933, pp. 200-210. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued March 24, 1933, and thereafter, at least for the time being, in the issue published on the last Friday of each month.)

Cholera

Philippine Islands.—For the week ended February 25, 1933, cholera was reported in the Philippine Islands as follows: Cebu Province, 8 cases, 7 deaths; Leyte Province, 26 cases, 23 deaths.

Plague

Argentina.—On February 9, 1933, 5 fatal cases of plague were reported in Cordoba Province, Argentina.

Yellow Fever

Gold Coast.—During the week ended February 18, 1933, a fatal case of yellow fever was reported in Secondi District, Gold Coast.

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UNITED STATES PUBLIC HEALTH SERVICE

HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst Surg Gen. R. C. WILLIAMS, *Chief of Division*

The PUBLIC HEALTH REPORTS are issued weekly by the United States Public Health Service through its Division of Sanitary Reports and Statistics, pursuant to acts of Congress approved February 15, 1893, and August 14, 1912.

They contain: (1) Current information of the prevalence and geographic distribution of preventable diseases in the United States in so far as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other communicable diseases throughout the world. (2) Articles relating to the cause, prevention, or control of disease. (3) Other pertinent information regarding sanitation and the conservation of the public health.

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PUBLIC HEALTH REPORTS

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CURRENT PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES [1]

January 29–February 25, 1933

The prevalence of certain important communicable diseases, as indicated by weekly telegraphic reports from State health departments to the United States Public Health Service, is summarized in this report. The underlying statistical data are published weekly in the Public Health Reports, under the section entitled "Prevalence of Disease."

Influenza.—The influenza incidence continued to decline through the month of February. For the four weeks ended February 25 the number of cases reported was 26,557, as against 25,207, 41,548, and 10,627 for the corresponding period in the years 1932, 1931, and 1930, respectively. A steady decline was apparent in all sections of the country, but in the regions along the Atlantic coast the incidence was still considerably in excess of that for the same period last year. Due in large part to a rather slow decline of the incidence in Maine, the number of cases reported for the New England States was more than seven times the number reported for the same period last year. In the South Atlantic group the incidence remained particularly high. The number of cases reported (12,103) was more than three times last year's figure for the same period.

Measles.—The number of cases of measles reported for the current period was almost twice the number reported for the preceding period. All regions contributed to this expected seasonal increase. The current figure (42,415 cases) was approximately 3,500 cases above the average for recent years. The disease was most prevalent in the South Atlantic and North and South Central States. In the West North Central group the number of cases reported (5,931) was more than four times the number reported for the same period last year; in the South Atlantic States the number (5,189) was almost double that of last year; and in the West South Central area the number (2,260) was more than seven times the figure for last year. In States

[1] From the Office of Statistical Investigations, U S Public Health Service The numbers of States included for the various diseases are as follows Typhoid fever, 48, poliomyelitis, 48, meningococcus meningitis, 48, smallpox, 48, measles, 48, diphtheria, 48, scarlet fever, 48, influenza, 38 States and New York City. The District of Columbia is counted as a State in these reports.

along the North Atlantic Coast and in the far Western groups the seasonal increase was apparent but the incidence was considerably below that of last year.

Poliomyelitis.—The number of cases of poliomyelitis reported for the current 4-week period was 51. This number represented the lowest incidence of this disease during the corresponding period in the five years for which data are available. It was less than 40 per cent of the incidence for the same period last year and only about 50 per cent of the incidence in 1931. Each geographic area except the West South Central shared in this favorable situation. In that area eight cases were reported for the current period, as against one for the corresponding period last year.

Smallpox.—For the country as a whole, the number of cases of smallpox reported for the four weeks ended February 25 was 748, as against 1,402, 4,137, and 6,642 for the corresponding period in the years 1932, 1931, and 1930, respectively. In each geographic area, except the Mountain and Pacific, the incidence was the lowest in recent years. An increase in the number of cases in Idaho from 11 for this period last year to 45 for the current period and in California a corresponding increase from 15 to 150 cases seemed mostly responsible for a 20 per cent increase in the combined Mountain and Pacific areas over the corresponding period last year. The number of cases (232) was, however, considerably below that of other recent years. (See the note on the decrease in smallpox incidence on opposite page.

Typhoid fever.—The incidence of typhoid fever declined about 35 per cent during the current 4-week period from the preceding period. In relation to recent years the number of reported cases (481) for the country as a whole was the lowest in five years. Each geographic area, except the West North Central and Mountain and Pacific, showed very appreciable decreases from last year's figure for the corresponding period. In those areas the incidence very closely approximated that of last year.

Scarlet fever.—For the country as a whole, the number of cases of scarlet fever (22,629) reported for the four weeks ended February 25 was approximately the same as was reported for the corresponding period in 1932 and 1931. In the years 1930 and 1929 the cases for this period totaled 20,851 and 18,913, respectively. While an increase over last year was reported from the East North Central and Mountain States, in general the incidence in all areas came close to the average for recent years.

Meningococcus meningitis.—While the incidence of meningococcus meningitis was the lowest in recent years, it was very close to the incidence for the corresponding period last year. For the current 4-week

period the number of cases was 307, as against 327, 588, and 1,001 for the corresponding period in the years 1932, 1931, and 1930, repectively. A rather high incidence in Virginia and North and South Carolina seemed mostly responsible for a 50 per cent increase over last year's figure in the South Atlantic group of States, and 17 cases reported from Oklahoma, as against 7 last year, brought the incidence in the West South Central group up to a more than 50 per cent increase over last year. Other areas either approximated last year's figure or showed decreases.

Diphtheria.—There were 3,187 cases of diphtheria reported for the current 4-week period—approximately 1,000 less than were reported for the preceding period. A comparison with preceding years shows that for the whole reporting area the total number of cases was about 60 per cent of the number reported for the corresponding period last year and 70 per cent of the number in 1931. Each geographic area reported a very appreciable decrease. In fact, for the country as a whole and for practically all sections of the country, the reported incidence was the lowest for this period in the five years for which data are available.

Deaths, all causes.—The average mortality rate from all causes in large cities, as reported by the Bureau of the Census for the 4-week period ended February 25 was 12.2 per thousand population (annual basis). The current rate was practically the same as that for the corresponding period last year. For this period in the years 1931, 1930, and 1929 the rate was 14.2, 13.7 and 15.6, respectively.

NOTE ON SMALLPOX INCIDENCE IN THE UNITED STATES

A very noticeable decrease in smallpox incidence has occurred in the last two years. The following table shows the numbers of reported cases of smallpox in the United States for the years 1928 to 1932, inclusive.

Number of cases of smallpox reported in the United States for the years 1928 to 1932

Year	Cases of smallpox reported	Year	Cases of smallpox reported
1928	39,396	1931	30,232
1929	42,282	1932	11,168
1930	48,907		

The number of cases of smallpox reported for the year 1932 is 27.8 per cent of the average for the preceding four years.

The following table gives a comparison of the cases of smallpox reported during three 4-week periods of the winter of 1932–33 with corresponding periods of the preceding five years:

	Average number of cases per week			
	Last 4 weeks of December	First 4 weeks of the calendar year	Second 4 weeks of the calendar year	12 weeks of midwinter
1927–28	776	1,202	1,289	1,089
1928–29	605	740	982	776
1929–30	1,163	1,638	1,660	1,487
1930–31	543	979	1,055	859
1931–32	304	193	378	392
1932–33	128	160	187	158

The number of cases of smallpox reported for the 12-week period in 1932–33 is only 17.2 per cent of the average number for the corresponding period of the preceding five years; for three of the five years this period included the heaviest incidence of the year.

It is possible that there may be some relation between this notable drop and the more general use of cold storage for smallpox vaccine in the field.

No other disease which is reported to the Public Health Service shows any such notable reduction in incidence during the period covered.

ROCKY MOUNTAIN SPOTTED FEVER

Investigation of Sexual Transmission in the Wood Tick *Dermacentor andersoni* [1]

By Cornelius B. Philip, *Associate Entomologist*, and R. R. Parker, *Special Expert, United States Public Health Service*

In 1909 Ricketts advanced an hypothesis to account for the persistence of Rocky Mountain spotted fever virus in *Dermacentor andersoni* in nature. The fundamental concept involved was the starting each year of new lines of infection in previously noninfected ticks through simultaneous infestation of susceptible small mammalian hosts by both noninfected and infected ticks. Generation to generation transmission of the virus through the medium of the eggs was relegated to a position of secondary importance. In the main, this hypothesis has been accepted generally as the most likely explanation of the phenomena concerned. However, observations incident to experimental studies made at the Public Health Service Laboratory at Hamilton, Mont., during the past 10 years have raised two

[1] Contribution from the Rocky Mountain spotted fever laboratory of the U. S. Public Health Service, Hamilton, Mont.

questions concerning this hypothesis: First, that it fails to take account of the possibility of sexual transmission of the virus, i. e., transfer of the organisms from infected to noninfected ticks of the opposite sex during copulation; and second, whether or not the phenomenon of generation to generation transmission of the virus may have been unduly subordinated.

This paper concerns particularly the possibility of sexual transmission. There are two references which bear on this question. Wolbach (1919) has recorded the occurrence of the organisms in the spermatozoa of infected males—an observation repeatedly confirmed at this laboratory—and Parker (1923), in discussing maintenance of the virus, writes "there are no apparent avenues for the spread of the infection among ticks" other than those suggested by Ricketts, "unless it be by the act of copulation."

Transfer of the virus between the sexes must increase the number of infected ticks if it is to function as a factor of consequence in virus maintenance. Such an increase could conceivably result from the transfer of infectious secretions from infective male to "normal" female ticks or *vice versa*, or by infected spermatozoa. In the case of transfer by virus-containing secretions, a generalized infection of the opposite sex might follow. In the case of transfer by infected spermatozoa, however, it appears that individual ova and their resultant larvæ may become infected; but it is less evident that a generalized invasion of the parent female tissue would necessarily occur. The experiments here reported concern generalized infection of the adult ticks only.

METHODS AND MATERIALS

Preliminary observations to determine the conditions under which copulation may occur experimentally showed that partially fed *D. andersoni* of both sexes will mate off the host with either unfed or partially fed individuals of the opposite sex. It was known that copulation does not take place between unfed ("flat") individuals.

The experiments were then so planned that the ticks could be observed, and only groups or pairs of ticks known to have mated were used. Furthermore, in the cases of attempted male to female transfers of the virus, all females concerned were permitted to oviposit in order that impregnation could be verified by egg fertility. Since copulation does not occur between unfed ticks, there was no possibility that fertilization could have taken place antecedent to the tests which are detailed.

Pill boxes with cellophane windows were used in order to observe pairs of experimental ticks. Copulation was encouraged by darkening the boxes between the brief periods of observation.

After copulation was observed to have occurred, and in order to determine whether test ticks had acquired demonstrable infection, they were permitted to feed on normal male guinea pigs for minimum periods of nine days or, in the case of female ticks, until complete engorgement had been accomplished. This minimum period of feeding was employed to allow an elapse of time sufficient for the virus, if present, to reach the salivary glands. This is in accordance with the minimum incubation period of 9 days, following a 3-day infective feeding, observed by Spencer and Parker (1930b) in a single series of tests with *D. andersoni*.

If a test guinea pig showed fever and the characteristic scrotal lesions of Rocky Mountain spotted fever, or if there was pyrexia without scrotal lesions and the animal was shown to be immune to a subsequent injection of controlled guinea pig blood virus, the test was considered positive. On the other hand, if a host guinea pig remained afebrile and was susceptible to a later immunity test, the experiment was deemed negative, although the failure of a tick to infect its host can not be accepted as conclusive evidence that the virus is not present. This has been demonstrated repeatedly, in previous studies (Spencer and Parker, 1930a) and again in this paper. In order to meet this contingency, in our later experiments all male ticks and certain females which had not completely engorged were eviscerated immediately after removal from their hosts and injected into other guinea pigs.

Necropsies were performed on each test animal that died and gross lesions noted. If death occurred before immunity test and the lesions were atypical, diagnosis was established by the result of spleen transfer made intraperitoneally to a normal guinea pig.

For both the initial feeding prior to mating and for the later infectivity tests the experimental ticks were confined on the clipped bellies of male guinea pigs under screw-top capsules described elsewhere by Jellison and Philip (1933). The putting on and removal of ticks could thus be effected readily as desired.

The noninfected ticks used were from stock lots which had been reared through a considerable series of generations without evidence of infectivity. Where such ticks were permitted to feed partially on guinea pigs prior to allowing copulation, negative reactions of the host animals followed by immunity tests resulting in typical Rocky Mountain spotted fever were considered as confirmatory evidence of noninfectivity. No questionable reactions due to presumably noninfected ticks occurred.

Infected ticks used were from known infected laboratory-reared stock. As with the noninfected ticks, the initial partial separate feeding of both males and females served as a check on infectivity. In each instance the host guinea pig developed typical spotted fever.

EXPERIMENTAL

Six preliminary experiments were initiated in February, 1930, under varying conditions as described, in one experiment using noninfected, unfed females with infected, partially fed males, one involving noninfected, unfed males with infected, fed females, three experiments involving noninfected, partially fed females with infected, fed males, and one experiment using noninfected, fed males with infected, fed females. Of these, two resulted positively, the first test of unfed females and the last test of fed males, respectively.

1. *Infected, fed males with normal "flat" females.*—Eight fed, infected males were confined with five noninfected, unfed females and incubated at 37° C. for three days. The females were then placed on a normal guinea pig for nine days. The latter died on the fifteenth day following four days of fever but without scrotal lesions. Transfer of spleen tissue to a second guinea pig resulted in typical fatal infection.

The above females were then placed on another normal guinea pig, which died typically in 12 days.

2. *Infected, fed females with normal, "flat" males.*—Four fed, infected females were confined with six unfed, normal males and incubated for three days at 26° C. The males were than placed on a normal guinea pig on which they fed more or less continuously for 19 days. This animal remained afebrile for 22 days and died of typical infection after immunity test.

3. *Infected, fed males with noninfected, fed females.*—Four fed, infected males were placed with six partially fed, noninfected females at 26 C°. for five days. The females were then allowed to feed on a normal guinea pig for 11 days. No reaction resulted; and after 22 days the guinea pig was given an immunity test, which resulted in typical fatal disease.

4 and 5. Negative results under conditions similar to those in No. 3, above, were obtained from two other tests with four and five partially fed, noninfected females which had been placed with three and four infected males, respectively, for five days at room temperature.

6. *Infected, fed females with noninfected, fed males.*—Eight fed, infected females were confined with seven fed, normal males for five days at room temperature. The males were then isolated on damp sand trays for 23 days and finally allowed to feed on a normal guinea pig for 15 days. Except for one day of mild fever of 39.8° C., on the second day of tick feeding, the animal registered normal temperature for 18 days. Two immunity tests were given, the second on the thirty-fourth day. Following both, the guinea pig remained afebrile.

A second series of tests was begun in February, 1932, using a larger number of ticks. No unfed ticks were used for mating in these ex-

periments. Copulation of the partially fed ticks was permitted under two sets of conditions, as described.

1. Single, noninfected ticks were placed in separate pill boxes and opportunity was permitted for each to mate with three infected individuals of the opposite sex. The latter were introduced singly on successive days. Three days thus elapsed between the initial partial blood meal and final confinement on the test guinea pig. Each of the ticks tested in this group was observed to pair with at least two and in many cases with all three of the infected ticks. Whether or not actual fertilization was accomplished at each pairing can not be stated.

Twelve of the originally noninfected ticks were tested on 10 guinea pigs. Two of the test animals became infected, six did not, while the two remaining tests were valueless, owing to intercurrent infection.

The two positive tests were of females that had mated with infected males. One test animal died in eight days, after three days of fever but without scrotal involvement; typical fatal infection resulted in a second animal after spleen transfer. The other test animal registered prolonged pyrexia, accompanied by scrotal swelling, necrosis, and sloughing. This pig recovered and resisted a later immunity test with controlled virus. The six negative tests followed the feeding of single females in two instances, of single males in two instances, and of two males in two instances. All six of the host guinea pigs were proved susceptible to infection by a later injection of controlled blood virus.

2. The remainder of the partially fed ticks were grouped in two lots—infected males with normal females, and vice versa. Observation of mating was not attempted. The lots were stored over damp sand at room temperature for 16 days before test feedings were started. This allowed both a longer period for the invasion of the tick tissues by the virus and greater opportunity for matings than in previous tests.

Thirteen feeding tests were made, using 16 males and 3 females. Eleven were negative and two valueless. In the 11 negative tests 1 male was used in each of 4 tests, 2 males in each of 6 tests, and 1 female in the remaining test. All guinea pigs proved susceptible when later injected with blood virus. The two valueless tests were of single females.

Because of the possibility that some of these ticks might contain virus which could not be demonstrated by feeding, the surviving ticks were injected into four guinea pigs. Three of these tests were of multiple ticks; two were valueless, and one test was negative. The fourth was of one female tick which had remained attached to the original test guinea pig for 20 days, although feeding poorly. It was finally removed and injected. The guinea pig died in seven days with all the characteristic symptoms and gross lesions of Rocky Mountain spotted fever.

SUMMARY AND DISCUSSION

The experiments reported here demonstrate that Rocky Mountain spotted fever virus may be transmitted from infected ticks of one sex to normal individuals of the opposite sex during copulation; also that the virus invades the tissues of the latter and is transmissible during subsequent feeding, just as would happen had the virus been acquired by ingestion or from a parent female. They do not, however, explain the medium by which transfer of the virus is effected, i. e., whether by transfer of male or female secretions or by infected sperm.

Of 23 tests performed, five were positive. Transmission of the virus from infected males to normal females was shown in 4 of 11 tests, while transmission from a group of infected females to normal males was demonstrated in 1 of 12 tests.

In the four positive male-to-female tests, three of the females transmitted the virus while completing engorgement. The fourth failed to do so by feeding on a guinea pig but was subsequently shown infected when eviscerated and injected into another guinea pig.

An inapparent infection was the result of the one positive female-to-male test. Virus of the type that produces this low grade reaction is rather frequently encountered in individuals of *D. andersoni* which have acquired infection either experimentally or in nature.

The period between the acquisition of virus by the ticks involved in the positive tests and its subsequent transmission is a matter of conjecture. That it may be relatively short is indicated by two of the tests in which 14 days was the time between confinement of the partially fed females with infected males and the onset of fever in the guinea pigs on which these females later completed engorgement. This interval included both the incubation period in the tick and that in the guinea pig. That it may also be considerably longer is shown by the test in which the female was attached for 20 days without infecting its host, though shown to be infected by subsequent injection.

According to these results, it becomes obvious that the number of infected females of any given generation of ticks can be increased through the mating of infected males with hitherto noninfected females. (The chance that an infected female will copulate with an infected male is relatively small, owing to the low percentage of infected ticks in nature, usually less than 3 per cent in the Bitterroot Valley.) Whether or not this number would be increased still further by males that acquire infection from females and later mate with normal females is less clear. In any event, it is obvious that the potentialities of generation to generation transmission through the egg are greater because of sex to sex transfer of the virus. Generation to generation transmission therefore may have correspondingly greater significance than hitherto supposed in the natural maintenance of the virus.

Sex to sex transmission may be of still further importance, owing to the possibility that an additional number of females (i. e., those in which a generalized tissue invasion may not occur) may deposit a certain percentage of infected eggs as a result of fertilization by infected sperm.

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COURT DECISIONS RELATING TO PUBLIC HEALTH

Damage caused by disposal of municipal sewage.—The subject of the liability of a city for damage caused by the disposal of sewage is treated in the following cases:

City of Harrisonville, Mo., *v.* W. S. Dickey Clay Mfg. Co., 61 F. (2d) 210, decided by the United States Circuit Court of Appeals, Eighth Circuit, on August 5, 1932.

Gotwals *v.* City of Wessington Springs, 244 N. W. 649, decided by the South Dakota Supreme Court on October 15, 1932.

Gray et al. *v.* City of High Point, 166 S. E. 911, decided by the North Carolina Supreme Court on December 21, 1932.

DEATHS DURING WEEK ENDED FEBRUARY 25, 1933

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Feb. 25, 1933	Corresponding week, 1932
Data from 85 large cities of the United States:		
Total deaths	8,772	9,011
Deaths per 1,000 population, annual basis	12.3	12.9
Deaths under 1 year of age	644	614
Deaths under 1 year of age per 1,000 estimated live births [1]	55	51
Deaths per 1,000 population, annual basis, first 8 weeks of year	12.6	12.1
Data from industrial insurance companies:		
Policies in force	68,993,332	73,951,428
Number of death claims	13,943	13,563
Death claims per 1,000 policies in force, annual rate	10.5	9.6
Death claims per 1,000 policies, first 8 weeks of year, annual rate	11.3	9.9

[1] 1933, 81 cities; 1932, 78 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks ended March 4, 1933, and March 5, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended March 4, 1933, and March 5, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Mar. 4, 1933	Week ended Mar. 5, 1932	Week ended Mar. 4, 1933	Week ended Mar. 5, 1932	Week ended Mar. 4, 1933	Week ended Mar. 5, 1932	Week ended Mar. 4, 1933	Week ended Mar. 5, 1932
New England States:								
Maine	-	2	13	8	4	385	0	1
New Hampshire	-	1	11	-	-	17	0	0
Vermont	2	-	-	-	29	69	0	0
Massachusetts	24	33	8	18	323	584	1	1
Rhode Island	3	13	8	2	-	714	0	0
Connecticut	1	7	24	20	178	283	1	0
Middle Atlantic States:								
New York	62	122	[1] 53	[1] 514	3, 301	2, 307	1	10
New Jersey	18	56	75	212	1, 093	170	4	1
Pennsylvania	69	168	-	-	1, 328	2, 489	17	7
East North Central States:								
Ohio	44	59	23	233	609	570	2	3
Indiana	30	42	96	200	40	59	3	10
Illinois [2]	47	88	70	202	277	263	21	4
Michigan	10	31	13	154	975	767	2	1
Wisconsin	5	23	143	704	106	405	1	1
West North Central States:								
Minnesota	5	10	-	2	1, 444	15	6	0
Iowa	7	15	-	-	2	8	1	0
Missouri	32	22	10	15	284	117	11	2
North Dakota	5	6	57	-	221	59	2	1
South Dakota	4	4	2	66	8	27	0	0
Nebraska	10	4	7	86	16	21	0	1
Kansas	14	7	9	19	292	169	0	0
South Atlantic States:								
Delaware	4	3	-	1	3	-	0	0
Maryland [3]	12	29	44	166	11	40	0	5
District of Columbia	9	14	1	7	8	2	0	2
Virginia	14	-	-	-	399	-	1	-
West Virginia	21	18	53	295	281	470	1	0
North Carolina	18	22	168	44	370	457	2	2
South Carolina	12	8	1, 151	1, 049	129	128	0	1
Georgia [1]	19	5	381	118	28	12	5	2
Florida	10	13	23	9	10	3	0	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended March 4, 1933, and March 5, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Mar. 4, 1933	Week ended Mar. 5, 1932	Week ended Mar. 4, 1933	Week ended Mar. 5, 1932	Week ended Mar. 4, 1933	Week ended Mar. 5, 1932	Week ended Mar. 4, 1933	Week ended Mar. 5, 1932
East South Central States:								
Kentucky	14	32	82	653	67	82	1	4
Tennessee	16	19	93	1,165	89	104	3	1
Alabama [2]	11	15	148	99	33	5	0	2
Mississippi	8	20					0	0
West South Central States:								
Arkansas	4	10	101	81	37	1	1	0
Louisiana	8	23	6	169	51	110	2	0
Oklahoma [4]	10	30	160	1,533	18	75	3	1
Texas [2]	54	61	317	225	615	18	4	0
Mountain States:								
Montana			31	2,652	205	42	1	0
Idaho	1	1	1	1	63		0	0
Wyoming			2		1		0	0
Colorado	3	5	58		4	80	8	1
New Mexico	10	8	18	2,012	2	105	0	2
Arizona	2	2	2	9	24		0	1
Utah [3]	3	1	4		5	4	0	0
Pacific States:								
Washington	7	4	1	8	32	682	1	2
Oregon	1	4	43	245	160	192	1	0
California	62	58	133	227	911	403	3	10
Total	725	1,118	3,643	13,223	14,081	12,508	110	79

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Mar. 4, 1933	Week ended Mar. 5, 1932	Week ended Mar. 4, 1933	Week ended Mar. 5, 1932	Week ended Mar. 4, 1933	Week ended Mar. 5, 1932	Week ended Mar. 4, 1933	Week ended Mar. 5, 1932
New England States:								
Maine	0	0	20	8	0	0	1	0
New Hampshire	0	0	35	28	0	0	0	0
Vermont	0	0	13	9	0	8	0	0
Massachusetts	0	2	436	457	0	0	0	2
Rhode Island	0	0	30	57	0	0	0	0
Connecticut	0	0	109	143	2	2	0	0
Middle Atlantic States:								
New York	1	1	981	1,811	0	0	8	11
New Jersey	0	0	335	322	0	0	2	2
Pennsylvania	1	1	1,171	645	0	7	6	10
East North Central States:								
Ohio	0	0	673	341	3	96	8	6
Indiana	1	0	195	144	1	6	2	1
Illinois [2]	0	0	477	387	15	8	5	6
Michigan	1	0	548	552	1	12	1	7
Wisconsin	2	0	162	119	0	14	1	2
West North Central States:								
Minnesota	0	0	86	154	0	4	1	3
Iowa	0	2	41	48	44	15	0	0
Missouri	0	0	112	57	5	20	1	1
North Dakota	0	0	27	14	1	0	0	0
South Dakota	0	0	21	15	4	5	0	4
Nebraska	0	0	40	31	0	9	0	0
Kansas	0	1	56	47	2	4	1	2
South Atlantic States:								
Delaware	0	0	6	18	0	0	0	0
Maryland [3]	0	0	97	121	0	0	2	7
District of Columbia	0	1	13	51	0	0	0	2
Virginia	0		53		0		2	
West Virginia	0	0	31	58	0	3	2	4
North Carolina	0	1	33	47	5	2	4	4
South Carolina	1	0	11	10	0	0	3	7
Georgia [2]	0	0	12	14	3	0	8	15
Florida	0	0	5	6	0	1	4	3

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended March 4, 1933, and March 5, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Mar. 4, 1933	Week ended Mar. 5, 1932	Week ended Mar. 4, 1933	Week ended Mar. 5, 1932	Week ended Mar. 4, 1933	Week ended Mar. 5, 1932	Week ended Mar. 4, 1933	Week ended Mar. 5, 1932
East South Central States:								
Kentucky	0	0	55	117	1	2	4	16
Tennessee	0	0	63	37	1	28	7	10
Alabama [2]	0	0	13	27	1	15	2	5
Mississippi	0	1	11	7	0	32	3	3
West South Central States:								
Arkansas	0	0	14	8	0	22	6	1
Louisiana	0	0	14	20	0	2	2	15
Oklahoma [4]	0	0	23	39	1	3	2	6
Texas [2]	0	0	65	49	12	29	6	4
Mountain States:								
Montana	0	0	12	60	0	0	9	0
Idaho	0	0	4	3	4	2	1	0
Wyoming	0	0	1	4	0	0	0	0
Colorado	0	0	55	23	0	6	0	0
New Mexico	0	0	12	11	0	2	1	1
Arizona	0	0	18	9	0	0	0	0
Utah [3]	0	0	18	8	0	0	1	1
Pacific States:								
Washington	1	0	65	48	4	18	0	1
Oregon	0	0	20	30	10	24	0	1
California	0	5	239	143	56	11	7	2
Total	8	15	6,531	6,357	176	412	108	165

[1] New York City only.
[2] Typhus fever, week ended Mar. 4, 1933, 8 cases: 1 case in Illinois, 1 case in Georgia, 4 cases in Alabama, and 2 cases in Texas.
[3] Week ended Friday.
[4] Figures for 1933 are exclusive of Oklahoma City and Tulsa, and for 1932 are exclusive of Tulsa only.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
December, 1932										
New Hampshire	1	1						112		3
January, 1933										
Arkansas	3	46	13,427	31	46	135	2	88	47	12
Colorado	1	26	500		25		0	146	0	1
Kansas	10	45	7,098		346		4	304	2	8
Nevada	1	1	47		2		0	13	0	
New Hampshire		2						136		
Oregon	3	13	2,054		99		1	73	20	7
Puerto Rico		52	301	4,499	190	2	0		0	27
Rhode Island		21	661		3		0	194	0	
Wisconsin	9	22	10,376		775		2	593	17	4
February, 1933										
Nebraska	2	44	292		62		1	96	10	1

January, 1933

	Cases
Anthrax:	
Arkansas	1
Chicken pox:	
Arkansas	157
Colorado	335
Kansas	589
Nevada	6
Oregon	166
Puerto Rico	28
Rhode Island	89
Wisconsin	2,220
Conjunctivitis:	
Kansas	3
Dysentery:	
Puerto Rico	792
Filariasis:	
Puerto Rico	3
German measles:	
Kansas	11
Rhode Island	3
Wisconsin	16
Hookworm disease:	
Arkansas	6
Impetigo contagiosa:	
Colorado	18
Kansas	1
Oregon	64
Leprosy:	
Puerto Rico	5
Lethargic encephalitis:	
Kansas	3
Oregon	1
Wisconsin	2
Mumps:	
Arkansas	71
Colorado	256
Kansas	493
Oregon	12
Puerto Rico	19
Rhode Island	54
Wisconsin	403
Ophthalmia neonatorum:	
Kansas	1
Puerto Rico	5
Rhode Island	1
Paratyphoid fever:	
Oregon	2
Puerperal fever:	
Puerto Rico	11
Scabies:	
Colorado	12
Kansas	16
Oregon	69
Septic sore throat:	
Kansas	2
Oregon	2
Rhode Island	1
Tetanus:	
Puerto Rico	13
Tetanus, infantile:	
Puerto Rico	26
Trachoma:	
Arkansas	45
Kansas	1
Puerto Rico	32
Wisconsin	1
Tularaemia:	
Arkansas	2
Kansas	5
Undulant fever:	
Kansas	1
Rhode Island	1
Wisconsin	3
Vincent's angina:	
Colorado	5
Kansas	2
Oregon	9
Whooping cough:	
Arkansas	50
Colorado	100
Kansas	115
Nevada	2
Oregon	20
Puerto Rico	111
Rhode Island	76
Wisconsin	424
Yaws:	
Puerto Rico	7

February, 1933

	Cases
Nebraska:	
Chicken pox	181
Leprosy	1
Septic sore throat	1
Whooping cough	33

WEEKLY REPORTS FROM CITIES

City reports for week ended February 25, 1933

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	0		2	4	6	7	0	3	0	12	42
New Hampshire:											
Concord	1		0	0	2	0	0	1	0	0	10
Nashua	0		0	0	0	0	0	0	0	0	
Vermont:											
Barre	0		0	0	0	1	0	1	0	4	4
Massachusetts:											
Boston	3	1	4	44	31	124	0	11	0	70	227
Fall River	0	2	1	0	5	11	0	0	0	4	32
Springfield	1	1	1	0	1	7	0	2	0	10	34
Worcester	1		0	5	2	20	0	1	0	2	48
Rhode Island:											
Pawtucket	0		0	0	0	0	0	0	0	0	21
Providence	1	2	1	0	4	22	0	3	0	12	69
Connecticut:											
Bridgeport	1	1	3	15	4	9	0	2	0	2	36
Hartford	0	2	0	1	3	11	0	1	0	0	35
New Haven	1	3	0	1	1	9	0	0	0	7	50
New York:											
Buffalo	6		1	5	27	47	0	6	0	33	165
New York	42	45	22	1,545	183	272	0	82	4	113	1,577
Rochester	0		2	1	7	35	0	1	0	4	84
Syracuse	0		0	1	4	25	0	0	0	8	44
New Jersey:											
Camden	0	2	3	1	5	14	0	0	0	0	35
Newark	0	11	1	327	6	33	0	5	0	24	76
Trenton	2	7	1	11	7	22	0	1	1	4	48
Pennsylvania:											
Philadelphia	3	9	6	67	32	146	0	33	0	2	497
Pittsburgh	2	6	5	7	17	56	0	6	0	19	156
Reading	0		0	73	6	13	0	0	0	6	38
Scranton	0		0	0	0	33	0	0	0	1	
Ohio:											
Cincinnati	3	3	5	1	15	16	0	12	0	5	148
Cleveland	9	79	4	2	17	168	0	12	0	41	170
Columbus	0	1	1	118	7	17	0	5	0	1	92
Toledo	1	2	2	81	1	66	0	7	0	0	63

City reports for week ended February 25, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Indiana:											
Fort Wayne	0	-------	0	1	0	2	0	1	0	0	23
Indianapolis	6	-------	0	13	16	14	0	6	0	7	-------
South Bend	0	-------	0	0	1	20	0	1	0	5	21
Terre Haute	1	-------	0	0	1	10	0	1	0	0	24
Illinois:											
Chicago	9	3	11	197	61	237	0	43	0	34	733
Springfield	3	-------	0	2	3	8	0	0	0	0	24
Michigan:											
Detroit	7	3	4	315	32	163	0	25	0	129	272
Flint	2	8	0	30	4	7	0	2	0	0	27
Grand Rapids	0	-------	0	2	3	14	0	2	0	34	48
Wisconsin:											
Kenosha	0	-------	0	1	1	3	8	0	0	14	2
Madison	0	-------	-------	54	-------	2	0	-------	0	0	-------
Milwaukee	0	2	2	4	3	43	0	4	0	30	109
Racine	0	-------	0	2	0	14	0	0	0	7	12
Superior	0	-------	0	0	0	0	0	0	0	7	8
Minnesota:											
Duluth	0	-------	0	3	1	2	0	1	0	28	14
Minneapolis	1	-------	0	926	7	39	0	3	0	9	102
St. Paul	0	2	2	104	4	11	0	4	2	66	62
Iowa:											
Des Moines	5	-------	-------	0	-------	4	0	-------	0	0	29
Sioux City	1	-------	-------	0	-------	2	0	-------	0	1	-------
Waterloo	0	-------	-------	0	-------	0	0	-------	0	0	-------
Missouri:											
Kansas City	1	-------	3	167	25	49	0	12	0	4	90
St. Joseph	2	-------	2	4	8	2	0	3	0	2	40
St. Louis	12	3	2	7	13	19	0	8	0	0	221
North Dakota:											
Fargo	0	-------	0	0	1	0	0	0	0	1	8
Grand Forks	0	-------	0	4	0	3	0	0	0	0	-------
South Dakota:											
Aberdeen	1	-------	-------	0	-------	0	0	-------	0	0	-------
Nebraska:											
Omaha	4	-------	0	10	10	11	0	4	0	0	56
Kansas:											
Topeka	0	-------	2	73	3	0	0	0	0	1	13
Wichita	2	-------	2	0	2	3	0	0	0	2	37
Delaware:											
Wilmington	2	-------	0	6	4	3	0	2	1	0	43
Maryland:											
Baltimore	3	15	4	3	24	83	0	6	1	18	225
Cumberland	0	-------	0	0	5	2	0	0	0	0	18
Frederick	0	-------	0	0	0	0	0	1	0	0	3
District of Col.:											
Washington	5	5	1	2	14	12	0	17	0	1	180
Virginia:											
Lynchburg	0	-------	0	0	1	1	0	0	0	0	10
Norfolk	2	-------	0	0	4	2	0	1	0	3	23
Richmond	3	-------	2	0	6	5	0	7	0	0	60
Roanoke	0	-------	0	168	1	3	0	0	0	0	18
West Virginia:											
Charleston	1	3	0	0	4	1	0	0	0	2	12
Huntington	0	-------	-------	20	-------	0	0	-------	0	0	-------
Wheeling	0	1	0	40	5	2	0	1	0	7	14
North Carolina:											
Raleigh	0	-------	0	1	2	0	0	1	0	1	12
Wilmington	0	-------	0	60	2	2	0	0	0	1	11
Winston-Salem	1	-------	1	0	0	3	0	3	0	9	12
South Carolina:											
Charleston	0	51	0	0	2	0	0	1	0	1	17
Columbia	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Greenville	0	-------	-------	31	-------	0	0	-------	0	0	-------
Georgia:											
Atlanta	4	11	1	2	9	3	0	3	0	21	82
Brunswick	0	-------	0	0	1	0	0	1	0	0	5
Savannah	0	184	4	0	3	0	0	0	0	0	31
Florida:											
Miami	1	13	3	1	0	2	0	2	3	3	29
Tampa	2	1	1	0	2	0	0	2	0	7	25

City reports for week ended February 25, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Kentucky:											
Ashland	1		0	0	0	1	0	0	0	0	1
Lexington	0		0	2	2	0	0	2	0	0	16
Louisville	2	6	0	0	15	11	0	6	0	0	107
Tennessee:											
Memphis	2		1	9	7	10	0	2	1	13	81
Nashville	3		1	0	5	2	0	2	1	2	47
Alabama:											
Birmingham	6	2	4	0	6	2	0	4	1	0	55
Mobile	2		2	0	2	0	0	0	0	0	21
Montgomery	0	5		0		0	0		0	1	
Arkansas:											
Fort Smith	0			0		0	0		0	0	
Little Rock	0		0	0	1	3	0	1	0	1	3
Louisiana:											
New Orleans	12	3	2	1	10	5	0	5	0	0	158
Shreveport	0		0	1	3	1	0	2	0	0	46
Oklahlma:											
Oklahoma City	0	35	3	0	12	9	0	0	0	0	42
Tulsa	0			1		4	1		0	3	
Texas:											
Dallas	11	3	3		14	3	0	6	1	1	97
Fort Worth	3		2	162	9	8	0	1	0	0	46
Galveston	4		0	1	4	2	0	1	0	0	14
Houston	5		2	57	11	0	0	2	0	0	87
San Antonio	0		5	12	12	1	0	10	0	2	72
Montana:											
Billings	0		0	1	0	0	0	0	0	0	5
Great Falls	0		1	5	3	0	0	0	0	0	9
Helena	0		0	0	0	0	0	0	0	0	3
Missoula	0		0	1	0	1	0	0	0	0	8
Idaho:											
Boise	0		0	44	1	0	2	1	0	0	8
Colorado:											
Denver	1	53	3	4	18	10	0	5	0	2	78
Pueblo	0		0	0	4	2	0	1	0	2	7
New Mexico:											
Albuquerque	0	1	0	0	1	1	0	3	0	0	11
Arizona:											
Phoenix	0		1	1	5	2	0	2	0	2	
Utah:											
Salt Lake City	0		2	1	0	4	0	0	0	6	41
Nevada:											
Reno	0		0	0	0	2	0	0	0	0	5
Washington:											
Seattle	0			3		9	0		0	6	
Spokane	0			1		0	0		0	0	
Tacoma	0		0	0	2	6	0	0	0	0	26
Oregon:											
Portland	1	2	0	3	6	5	1	3	1	2	78
Salem	0	2		41		0	0		0	0	
California:											
Los Angeles											
Sacramento	1	1	3	0	6	3	0	4	1	5	32
San Francisco	2	27	3	1	13	2	0	7	0	46	185

City reports for week ended February 25, 1933—Continued

State and city	Meningococcus meningitis		Polio-myelitis cases	State and city	Meningococcus meningitis		Polio-myelitis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				Delaware:			
Boston	0	0	1	Wilmington	1	0	0
				District of Columbia:			
New York:				Washington	0	1	0
New York	2	3	1	South Carolina:			
Pennsylvania:				Charleston	1	0	0
Philadelphia	4	5	0	Georgia:			
				Atlanta	2	0	0
Illinois:				Kentucky:			
Chicago	17	5	0	Louisville	1	0	0
Michigan:				Tennessee:			
Detroit	1	0	0	Memphis	1	0	0
Iowa:				Louisiana:			
Sioux City	2		0	New Orleans	1	1	0
Missouri:							
Kansas City	2	3	0	Colorado:			
St. Joseph	1	0	0				
St. Louis	1	0	0	Denver	0	1	0
				California:			
				San Francisco	0	1	0

Lethargic encephalitis.—Cases: New York, 1; Chicago, 1; Birmingham, 2.
Pellagra.—Cases: Worcester, 1; Baltimore, 1; Charleston, S. C., 3; Atlanta, 1; Savannah, 4; Dallas, 1.
Rabies (in man): Fort Worth, 1 case and 1 death.
Typhus fever.—Cases: Tampa, 1.

FOREIGN AND INSULAR

INFLUENZA IN EUROPE AND THE BRITISH ISLES

The health section of the League of Nations published data which show decreases in the prevalence of influenza in Copenhagen, Denmark (latest report February 11, 1933), France, (January 31), Hungary (February 18), and Switzerland (February 11).

England and Wales.—For the week ended February 18, 1933, 630 deaths from influenza were registered in the great towns of England and Wales, as compared with 1,306 deaths for the preceding week. In these towns the general death rate for the week ended February 18, 1933, was 15.9 per 1,000. The peak in the general death rate was reached during the week ended February 4, when it was 26.8 per 1,000.

Irish Free State—Dublin.—For the four weeks ended February 18, 1933, deaths from influenza were registered in Dublin as follows: 20, 24, 44, and 20, respectively.

Netherlands—Amsterdam.—For the three weeks ended February 11, 1933, deaths from influenza and pneumonia were registered at Amsterdam as follows: 23, 39, and 57 deaths, respectively.

Germany.—Reports for the weeks ended February 11 and 18, 1933, showed decreases in the incidence of influenza among insured persons in most of the great towns of Germany. The general death rates in these towns for the first five weeks of the year 1933 were as follows: 11.6, 11.2, 11.6, 13.9, and 19.1, respectively.

CUBA

Habana—Communicable diseases—Four weeks ended February, 25, 1933.—During the four weeks ended February 25, 1933, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	9	1	Tuberculosis	13	2
Malaria [1]	6	2	Typhoid fever	12	3
Measles	1	1			

[1] Many of these cases are from parts of the island outside of Habana.

CZECHOSLOVAKIA

Communicable diseases—December, 1932.—During the month of December, 1932, certain communicable diseases were reported in Czechoslovakia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	4		Puerperal fever	51	21
Cerebrospinal meningitis	4	2	Rabies	2	2
Diphtheria	4,910	262	Scarlet fever	2,617	32
Dysentery	26	3	Trachoma	133	
Malaria	3		Typhoid fever	741	59
Paratyphoid fever	9				

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

(NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for February 24, 1933, pp. 200–210. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued March 24, 1933, and thereafter, at least for the time being, in the issue published on the last Friday of each month.)

Cholera

Philippine Islands.—For the week ended March 4, 1933, 2 cases of cholera were reported in the Province of Cebu, Philippine Islands, and 24 cases with 13 deaths in the Province of Leyte.

Smallpox

China.—For the week ended February 25, 1933, 41 cases of smallpox were reported at Canton and 63 cases at Hong Kong.

Yellow Fever

Gold Coast.—A fatal case of yellow fever was reported February 27, 1933, in the District of Sekondi, Gold Coast.

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UNITED STATES PUBLIC HEALTH SERVICE

HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst. Surg Gen R C WILLIAMS, *Chief of Division*

The PUBLIC HEALTH REPORTS are issued weekly by the United States Public Health Service through its Division of Sanitary Reports and Statistics, pursuant to acts of Congress approved February 15, 1893, and August 14, 1912.

They contain: (1) Current information of the prevalence and geographic distribution of preventable diseases in the United States in so far as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other communicable diseases throughout the world. (2) Articles relating to the cause, prevention, or control of disease. (3) Other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS are intended primarily for distribution to health officers, members of boards or departments of health, and those directly or indirectly engaged in or connected with public health or sanitary work. Articles of general or special interest are issued as reprints from the PUBLIC HEALTH REPORTS or as supplements, and in these forms are available for general distribution to those desiring them.

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PUBLIC HEALTH REPORTS

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CAUSES OF ILLNESS IN 9,000 FAMILIES, BASED ON NATION-WIDE PERIODIC CANVASSES, 1928-1931*

By SELWYN D. COLLINS, *Senior Statistician, United States Public Health Service*

CONTENTS

Mortality data are now available for all but one State and are published annually in great detail with respect to cause, age, sex, place of residence, etc. However, the important causes of death are not the most frequent causes of illness, and the mortality picture that can be painted in considerable detail does not adequately or properly represent the sickness situation.

As compared with mortality, the paucity of sickness records is almost unbelievable. Morbidity reports as furnished by physicians to local health departments are available in summarized form for many States (1), but aside from including only a few causes, they are woefully incomplete even for the reportable diseases. Special studies in a few localities (6) have made available reports by physicians of all diseases seen by them, but they give no indication of the large number of illnesses that are not attended by doctors.

The most complete morbidity records for an approximately full list of diseases refer to the sickness experience of members of a group of

* From the Office of Statistical Investigations, U. S. Public Health Service. This is the first of a series of papers on sickness and medical care in this group of families. The survey of these families was organized as the basic investigation of the Committee on the Costs of Medical Care. After the records had been accumulated by the Committee, a cooperative arrangement between the Committee and the Public Health Service was made and the data were tabulated under the joint supervision of the Office of Statistical Investigations and members of the research staff of the committee. Committee publications based on the results are to deal primarily with costs and Public Health Service publications primarily with the incidence of illness and the extent and kind of medical care, without regard to cost. As costs are meaningless without the extent and nature of the service received, there will inevitably be some overlapping.

Grateful acknowledgment is made for advice and assistance received in the course of the study from various members of the research staff of the Committee on the Costs of Medical Care, particularly Dr. I. S. Falk and Miss Margaret Klem, and from members of the statistical staff of the Public Health Service. Special thanks are due to Dr. Amanda L. Stoughton for advice and assistance in classifying the causes of sickness and death, and to Miss Lily Vanzee, who was in immediate charge of tabulating the data.

industrial sick benefit associations. Records are available since 1920 but they are confined to severe illnesses causing absence from work of more than one week (2). A few special studies have been made of sickness among employees of certain industrial companies (3) and of school children (4, 7, 9, 12).

Extensive surveys to determine the *prevalence on a given day* of various kinds of sickness have been made of the families of insured persons (10). In a study in Hagerstown (11) a *series* of visits was made to each of about 1,800 representative families and all illness that occurred in the course of a 28-month period recorded; the total observation on the almost 8,600 individuals amounted to nearly 17,000 person-years of life. This is apparently the only study of *sickness incidence over a period of time* in a population of all ages and both sexes, in contrast to the wealth of mortality data of this kind extending over many years in nearly every civilized country in the world.

The present project, which generally followed the Hagerstown method, covered about 9,000 families observed for 12 months in 18 States with a total of nearly 39,000 person-years of life. It is therefore the largest mass of data on the *incidence* of sickness *over a period of time* that is now available for illnesses of all kinds in a fairly representative general population group. Only by such intensive studies can the real incidence of illness be ascertained. With a population of the size surveyed in this study an opportunity is afforded for finding the frequency of some of the more rare conditions as well as the common causes of illness.

METHOD OF COLLECTING THE DATA

The object was to obtain a complete record of illness and of medical and dental care in a group of representative families for a 12-month period. During the year a series of visits was made to the home of each family to obtain by an interview with the housewife or other responsible member of the household the desired information about illness and medical care and record the data on a schedule prepared for that purpose. The data collected on the first regular canvass included a household census, with the name, sex, color, age, marital status, and occupation of each member of the family. On this call there was also obtained a record of any illness that had occurred within one month[1] prior to the visit. On subsequent visits made at intervals of two to four months, with an occasional family with a slightly longer interval, a record was obtained of illnesses that had occurred since the preceding call. Usually a family was canvassed five or six times during the year, but occasional households received as few as four and others as many as eight visits, with some additional calls to check up incomplete records. Information recorded about

[1] In some communities illness was recorded for two months prior to the first visit instead of only one.

each illness reported to the investigator included the diagnosis or cause of the illness, date of onset, duration of the illness, and many detailed facts about the nature and extent of medical care of various kinds by different practitioners and institutions. Costs were also obtained, and these data are included in the committee's report (8).

Suitable areas for the type of families to be canvassed in a State were selected by conference with the State and local health officers. The actual canvassing was done by health department or other visiting nurses in the various communities that were studied. Arrangements were made through the health department for the nurse to do this work in addition to her regular duties, provided she was willing to undertake it. In inaugurating the study, the nurse did not include the regular families to which she was called by sickness, but selected a new group without respect to the presence or absence of illness in the household at the time of the initial visit. Usually the selection was by a house-to-house canvass.

Since the nurse's work was on a voluntary basis and in addition to her regular duties, it may at first appear that she would not give the same care to obtain exact data and make regular visits as would a paid investigator on a full-time basis. The completeness with which the many detailed items on the schedule were recorded indicates that this was not the case, and it is believed that the advantages of a full-time paid investigator are counterbalanced to a considerable extent by the fact that the volunteer nurse carried only 25 to 50 families, with whom she became rather intimately acquainted, whereas the full-time investigator would be expected to carry at least 300 families and would be unable to remember the situations in each family in the same detail. Since the nurse was approached through the health officer and undertook the job at his suggestion, she can not be looked upon as wholly a volunteer worker, for the satisfactory completion of the job became to a considerable extent something for which she was responsible to the health officer as well as to the Committee on the Costs of Medical Care.

COMPOSITION OF THE SURVEYED POPULATION

In a study of this kind, made through the cooperation of State and local health departments and visiting nurses, the data are necessarily confined to localities whose health departments would give a part of the time of one or more nurses to collect the special information. It is not intended to suggest that the willingness to cooperate was limited to the 130 localities included in the study, for it was impossible to include every community or to sample every State. It does mean, however, that the surveyed families all reside within localities having city or county health departments or visiting nurses, and the extent of service received in these families from health

departments and visiting nurses would not be representative of communities where such organizations do not exist.

The present study is based on 8,758 white families that were kept under observation for a full 12-month period. Of the 39,185 individuals in the families, 96.5 per cent were under observation for the whole period, the other 3.5 per cent being accounted for by births, deaths, and persons who because of marriage, separation, or other reasons left or entered an observed family during the year. Reduction of the part-time individuals to a full-time basis gives a total full-time person-years of life of 38,544.

Although each family was observed for sickness for 12 consecutive months, the date of the observation period varied for different families. Records for the first households began in February, 1928, and those for the last ended in June, 1931. More families were under observation in December, 1929, than in any other month. Fifty per cent or more of the households were under observation during each month from May, 1929, to April, 1930, inclusive, and October or November of 1929 may be taken as the midpoint of the survey. In general the families in the large cities (over 100,000) were surveyed somewhat earlier and those in towns and rural areas somewhat later than the average for all groups. Only about one-fourth of the households were under observation during December and January, 1928–29, at the time of the rather extensive influenza epidemic and, therefore, the respiratory illness records are not unduly influenced by the inclusion of this epidemic period. Table 1 gives the per cent of families that were under observation during each month.

TABLE 1.—*Time distribution of the observation period for the surveyed families*

[Per cent* of the 8,758 families that were under observation during each month, February 1928 June 1931]

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Oct.	Nov.	Dec.
1928	----	0.03	0.05	1.2	2.3	3.8	6.1	8.7	10.5	14.1	16.8	18.8
1929	28.7	35.4	40.7	46.9	54.4	57.0	58.8	59.6	60.5	59.8	60.3	63.7
1930	62.6	59.5	56.8	49.7	41.8	38.3	35.1	31.7	28.0	26.1	22.9	17.4
1931	8.6	5.1	2.5	2.2	1.0	.1	------	------	------	------	------	------

* Percentages add to 1200.0, since each family was under observation in 12 different months.

The geographic distribution of the families is shown by the accompanying map (fig. 1), on which each dot represents approximately 25 households. Families from 130 localities in 18 States are included, in which all nine of the usual census geographic sections except the West South Central have some representation. The map gives the appearance of an undue concentration of surveyed households in the North and East, but the general population is also dense in these sections. Table 2 shows the proportion of the surveyed families that

reside in each of four broad geographic areas as compared to all white families in the United States. These percentages indicate that the Northeast and the South (except the Atlantic seaboard) are somewhat underrepresented and the Pacific coast is somewhat overrepresented in the surveyed families.

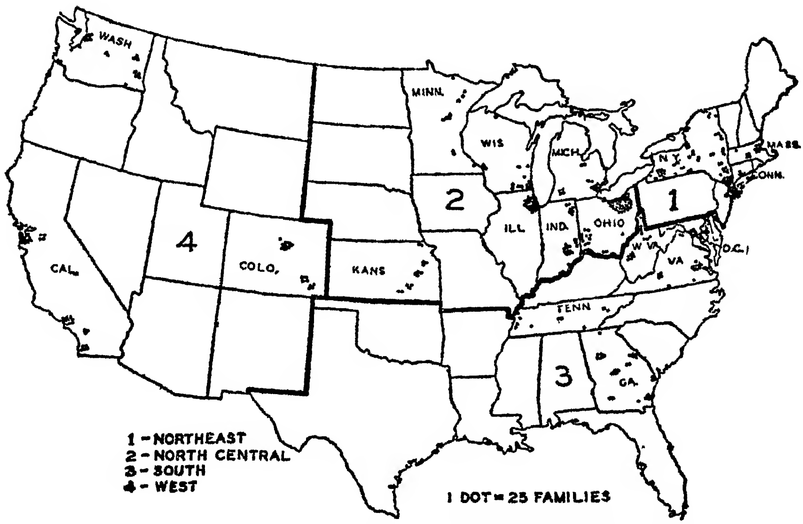

FIGURE 1.—Geographic distribution of 8,758 families observed for 12 consecutive months in 130 localities in 18 States, 1928-1931

TABLE 2.—*Geographic distribution of the surveyed families and of white families in the United States*

Population group	Per cent of families living in each geographic area				
	All sections	Northeast [1]	North Central [1]	South [1]	West [1]
Surveyed families, 1928-1931	100 0	23 9	37 1	18.1	20.9
United States, 1930	100.0	30 2	35.0	23.6	11.2

[1] Northeast = New England and Middle Atlantic; North Central = East and West North Central; South = South Atlantic and East and West South Central; West = Mountain and Pacific.

Table 3 shows the number of surveyed families in each State classified according to the size of the city in which they resided, with towns under 5,000 population further classified as industrial or agricultural.

TABLE 3.—*Distribution of families according to geographical section, State, and size of community*

[8,758 families surveyed for 12 consecutive months, 1928-1931]

Section and State	All communities	Cities with population of— 500,000 and over	100,000 but under 500,000	25,000 but under 100,000	5,000 but under 25,000	Towns with less than 5,000 Industrial	Agricultural	Rural areas
All sections:								
Number	8,758	1,854	1,549	1,362	785	602	1,120	1,486
Per cent	100.0	21.1	17.7	15.5	9.0	6.9	12.8	17.0
Northeast	2,097	312	349	250	148	94	514	421
New York	1,710	312	92	159	148	94	514	391
Massachusetts	287		157	100				30
Connecticut	100		100					
North Central	3,249	1,213	355	420	439	244	144	434
Illinois	463	463						
Ohio	1,148	602	160	64	93	85	72	72
Michigan	329	148	41	94				46
Indiana	491		127	32	133	7	12	183
Wisconsin	290			154	23	38	46	29
Minnesota	224				28	78	14	104
Kansas	301		27	76	162	36		
South	1,585		405	504	118	108	133	317
District of Columbia	99		99					
Virginia	412		193	93	87		67	22
West Virginia	318			171		84		63
Tennessee	212				8	24	26	154
Georgia	544		113	240	73		40	78
West	1,827	329	440	179	80	156	229	314
Washington	551		211		70		171	99
California	890	329	42	72	10	156	66	215
Colorado	386		187	107			92	

It will be of interest to compare the members of these 8,758 families with the general population of the United States with respect to certain characteristics that were included in the census of 1930. First as to the size of the city or town in which they resided, Table 4 shows the percentage of the surveyed population that lived in communities of different sizes as compared with the total population of the United States and of the 18 States included in the survey. As compared with the total population it will be seen that the surveyed group is somewhat overweighted for persons living in large cities and somewhat underweighted for persons living in rural unincorporated areas. The distribution of the canvassed population according to size of the city of residence is considerably more similar to that of the 18 States included in the survey than to that of the total United States. When the six kinds of communities are combined into three groups, as in the lower section of Table 4, the surveyed and the total population of the 18 States included in the survey are quite similar. Even in these broad groups, however, the surveyed families as compared with the total United States are somewhat overweighted for large cities and underweighted for towns and rural areas.

TABLE 4.—*Size of city of residence for the surveyed and for the white population of the United States*

[Percentage of the population living in communities of specified sizes]

Population group	All communities	Cities with population of— 500,000 and over	100,000 but under 500,000	25,000 but under 100,000	5,000 but under 25,000	Towns with less than 5,000	Rural unincorporated areas
Surveyed, 1928–1931	100.0	20.3	16.9	15.9	9.2	19.8	17.9
Total of the 18 States, 1930 [1]	100.0	24.9	14.4	11.1	11.5	9.5	28.6
Total United States, 1930	100.0	17.0	12.6	10.5	12.2	11.3	36.1
Surveyed, 1928–1931	100.0	37.2		25.1		37.7	
Total of the 18 States, 1930 [1]	100.0	39.3		22.6		38.1	
Total United States, 1930	100.0	29.6		22.7		47.7	

[1] The 18 States in which the surveyed families reside.

The mean size of the surveyed families was 4.41 persons as compared with 3.80 for white families in the United States in 1930. When one-person households are omitted from the census, as nearly all were from the surveyed group, the means are 4.46 for the canvassed and 4.03 for the general population. The corresponding medians for families of two or more persons are 4.16 and 3.61. Table 5 shows the distribution of families according to size in the United States and in the surveyed group. The modal white family in the United States in 1930 consisted of only two persons, but in the surveyed group it consisted of four persons.

TABLE 5.—*Size of surveyed families and of white families in the United States*

Population group	Average number of persons per family [1]		Per cent of families with specified numbers of persons									
	Mean	Median	1	2	3	4	5	6	7	8	9	10 and over
United States, 1930	3.80	3.42	7.4	23.2	21.2	18.0	12.2	7.6	4.6	2.7	1.5	1.6
Surveyed families, 1928–1931	4.41	4.13	1.5	11.2	21.3	25.2	17.8	10.5	5.8	3.2	1.7	1.8
Cities over 100,000	4.24	4.00	1.5	11.8	23.7	25.9	17.4	9.0	5.5	2.8	1.3	1.1
Cities 5,000 but under 100,000	4.50	4.22	1.4	8.5	19.9	28.1	18.8	11.3	5.4	2.9	1.6	2.1
Towns under 5,000 and rural areas	4.52	4.23	1.6	12.4	19.8	23.4	17.5	11.5	6.5	3.9	2.1	2.3

[1] For families of 2 or more persons averages are as follows: Means, United States, 1930, 4.03; surveyed, 4.46: medians, United States, 1930, 3.61, surveyed, 4.16.

With respect to age distribution, Table 6 affords a comparison of the surveyed population with the United States census white population of 1930. In general there is an excess of children and a deficiency of older persons in the surveyed group as compared with the general population. The surveyed group tends to be composed of families with children and therefore of family heads of childbearing age rather than older people. One-person families were deliberately avoided in

the survey and this fact at least partly accounts for the excess of children.

TABLE 6.—*Age distribution of the surveyed and of the white population of the United States*

[Per cent of the population in each age group]

Population group	All ages	Under 5	5-9	10-14	15-19	20-24	25-34	35-44	45-54	55-64	65 and over
Both sexes:											
Surveyed population, 1928-1931	100.0	13.4	15.0	12.0	8.1	5.7	14.9	15.5	8.8	3.9	2.7
United States, 1930	100.0	9.1	10.1	9.7	9.3	8.7	15.4	14.1	10.8	7.1	5.7
Ratio of surveyed to United States (U. S.=1.00)	1.00	1.47	1.49	1.24	.87	.66	.97	1.10	.81	.55	.47

With respect to sex, there are relatively fewer males in the surveyed population than in the United States as a whole. (Table 7.) In the United States there are 103 males of all ages for each 100 females, while in the surveyed group there were 96 males per 100 females.

TABLE 7.—*Males per 100 females in the surveyed population and in the white population of the United States*

Population group	All ages	Under 5	5-9	10-14	15-19	20-24	25-34	35-44	45-54	55-64	65 and over
Surveyed population, 1928-1931	96	105	97	102	99	73	74	101	122	119	79
United States, 1930	103	104	103	103	100	97	99	106	109	107	100

Table 8 shows the proportion of family heads in the surveyed group that were native born, as compared with white families in the United States. Considering all geographic sections, 85 per cent of the surveyed family heads were native born, as compared to 78 per cent in the general white population. The discrepancy is accounted for by the Northeast and the North Central sections, the surveyed family heads in the South and West being quite similar as to nativity to those in the general populations of the respective sections.

TABLE 8.—*Nativity of family heads in the surveyed and in the white population of the United States*

[Per cent of family heads in different geographic divisions that were native born]

Population group	Total United States	Northeast [1]	North Central [1]	South [1]	West [1]
Total United States, 1930	78.5	63.4	79.6	96.2	78.7
Surveyed families, 1928-1931	85.5	81.5	85.7	96.8	79.9
Cities over 100,000	78.0	68.4	79.3	95.1	74.3
Cities 5,000 but under 100,000	92.0	81.5	92.5	96.3	96.8
Towns under 5,000 and rural areas	89.2	89.9	90.9	98.9	80.0

[1] See Figure 1 and Tables 2 and 3 for States included in the different sections.

Table 9 shows the marital status of persons of specific ages in the surveyed families and in the general population. In the canvassed group 72 per cent of the persons 15 years old and over are married, as compared with 61 per cent in the general population. Considered by age, this higher percentage married in the surveyed population is true for all age groups except 15–19 years, but at 20–24 years the percentages are practically the same. Inasmuch as the canvassed group is made up of natural families and therefore excludes boarding houses and institutions of various kinds where the single and widowed would be found to predominate, it might be expected that the surveyed families would contain relatively more married persons.

TABLE 9.—*Marital status of the surveyed and of the total population of the United States*

[Per cent of persons of the specified sex and age that were married]

Population group	Total over 15 years	15–44	15–19	20–24	25–29	30–34	35–44	45–54	55–64	65 and over
Both sexes:										
Surveyed population, 1928–1931	71.7	68.2	3.2	40.7	84.0	91.8	93.0	90.9	81.9	52.0
United States, 1930	60.7	56.5	7.2	40.2	68.0	78.8	81.6	78.6	70.4	49.3
Male										
Surveyed population, 1928–1931	74.0	66.8	.8	25.8	82.0	93.0	96.1	95.7	93.7	72.8
United States, 1930	60.1	52.0	1.7	25.2	61.4	76.1	81.6	81.7	78.1	63.8
Female:										
Surveyed population, 1928–1931	69.6	69.4	5.5	51.6	85.3	90.7	89.8	85.1	67.8	35.4
United States, 1930	61.2	61.0	12.7	51.7	74.4	81.6	81.6	75.3	62.1	31.8

Family income is of vital importance in any consideration of the character and extent of medical service received. In collecting the data the object with respect to income was to include in the surveyed households a reasonably adequate sample of families of different income levels with no special effort to obtain a distribution according to income that was similar to that in the United States. However, the distribution of total families included in the survey is not dissimilar to that of the estimated distribution in the United States at the time the survey was made. The last year for which an estimated distribution of families in the United States according to income is available is 1928. Estimates of average income have been made for later years. In 1929 average income was greater and in 1930 it was less than in 1928. The great bulk of the sickness observations were made in 1929 and 1930 before the large decrease in income that has taken place since those years. The 1928 distribution of family incomes is therefore not inappropriate for comparison with the incomes of the surveyed families. Table 10 affords a comparison of the distributions. The original estimate made for the Committee on the Costs of Medical Care by Dr. Maurice Leven was later revised by him and others of the Committee's research staff. Both distributions are shown in the table. Whether the original or the revised esti-

mate for the United States is taken as the standard, it may be seen that the surveyed group is somewhat overweighted by families with incomes above $5,000 and somewhat underweighted by those with incomes under $2,000. Part of the discrepancy may be due to the fact that the canvassed families are all white, but data are not available for the estimated incomes of white families for the country as a whole. In general the survey and whole population income distributions are rather similar, and the total canvassed group can therefore be dealt with as a unit without giving results that are unduly influenced by the difference between the incomes of these families and those in the United States generally.

TABLE 10.—*Income distribution of families in the surveyed group and in the total United States*

Population group	Per cent of families [1] in specified annual income classes						
	All incomes	Under $1,200	$1,200 but under $2,000	$2,000 but under $3,000	$3,000 but under $5,000	$5,000 but under $10,000	$10,000 and over
Surveyed families, 1928-1931	100.0	15.1	32.9	26.0	13.9	8.5	3.6
United States, 1928							
Original estimate	100.0	15.0	34.8	24.6	15.7	7.0	2.9
Revised estimate	100.0	20.0	33.2	22.1	14.9	6.9	2.9

[1] Families of more than one person each. The 133 families of one person each in the surveyed population are disregarded. Data supplied by the Committee on the Costs of Medical Care (8) from estimates by Maurice Leven based on the distribution of individual incomes.

CASES INCLUDED AND THE CLASSIFICATION OF THEIR CAUSES

In this project, as in the Hagerstown study, what was reported as an illness was to a considerable extent a matter of what the patient or the family considered of sufficient importance to be remembered and designated as such. In both instances it might be said that an illness was defined as any condition, symptom, or disorder which persists for one or more days. To this definition for the Hagerstown project was added in the present study any condition for which medical service (exclusive of dental service, eye refractions, immunizations, and health examinations) was received and any condition for which drugs costing 50 cents or more were purchased. It is possible, therefore, that a number of conditions so mild that they were not reported as illness in the Hagerstown project were included in the medical care study because of an expenditure for drugs or a visit to a physician or other practitioner. In the medical care study, data were also collected on dental care, eye refractions, immunizations, and health examinations in which the patient was seldom ill in the usual sense of the word; but the present report is confined to illnesses and the consideration of these other medical and dental services is reserved for later papers. Obviously the record would contain rela-

tively few physical defects such as would be found on physical examination.

Illnesses that extended into the observation period were included even if the onset was prior to the study year. This policy was adopted because of the cost element and the desire to include all cases involving medical service or costs within the study period. For chronic conditions like nephritis, heart disease, diabetes, etc., the onsets are so gradual and the durations so long that the accumulated cases causing illness during the period of observation are far more important than the few cases that can be identified as having their original onset within this period. It was decided, therefore, in conformity with the method of tabulating chronic cases in the Hagerstown data, to include all that caused illness during the study whether or not the original onset of the disease fell within this period. The total number of cases with onset prior to the study was small, and the number for acute diseases was practically negligible. Rather than institute a different procedure for acute and chronic illnesses which would involve a decision in every case as to whether the condition was chronic, the acute cases with onset prior to the study were also included in the tabulation. For similar reasons a second attack within the study year of a more or less chronic condition was tabulated as a separate illness. The data, therefore, refer to illnesses rather than to cases of disease, but the numbers of second attacks of specific diagnoses within the 12-month period are negligible.

In coding the data, any continuous period of sickness was counted as one illness regardless of the number of diagnoses or their apparently unrelated character. A person sick with measles, mumps, and chickenpox without any intervening period between the cases was coded as a single illness and so tabulated in counting the total number of illnesses. To avoid losing the record of all except one of these diagnoses, a supplementary card was made for all contributory causes, and in the majority of the tabulations presented herewith the total number of cases of a given diagnosis, both primary and contributory, are included. For example, pneumonia cases would include all pneumonia whether a primary cause of illness or a complication or sequela of measles, whooping cough, influenza, or other disease. For the great majority of the diseases the contributory causes are few, but in the instance of some categories, such as pneumonia, otitis media, and others that commonly occur as sequelae to acute conditions of much less severity, the data would be incomplete without including these contributory causes with the primary cases of the same diagnosis.

An exception to the rule of a continuous period of sickness being counted as one illness was made for acute cases (such as colds, indigestion, etc.) occurring in an individual with some chronic condition (such as tumor, goiter, partial paralysis, etc.) which lasted throughout

the year, but which gave the patient little trouble. To apply here the general rule that the simultaneous occurrence of the two diagnoses be coded as a single illness would mean that persons with such chronic conditions could have but one illness during the study no matter how many times they had a cold or other acute condition. The instances of this kind were few, because many of the chronic cases represent definite attacks of more or less limited durations and not the whole course of the disease. A chronic impairment or disease generally appears in the illness record only when it causes some distress or is the subject of a medical consultation or examination.

When one of two diagnoses mentioned in reporting an illness was merely a symptom of the other, the case was coded with only one diagnosis. For example, grippe and headache, cold and fever, or kidney trouble and backache were coded as sole diagnoses and the symptoms disregarded. In a case in which the only diagnosis reported was merely a symptom, such as headache, dizziness, or rash, the symptom was coded as the diagnosis since there evidently was an illness and no better cause was available for the case. Occasionally symptoms were listed along with diagnoses to which they had no relation, but must have arisen from some separate and distinct condition. In such cases they are coded as contributory diagnoses. Respiratory illnesses were carefully checked to make sure that successive stages of the same case would not be coded as two diagnoses merely because two parts of the respiratory tract were mentioned. For example, bronchitis and coryza, influenza and tonsillitis, bronchitis and sore throat were all coded as sole diagnoses, but because of their frequency the detailed code provided separate numbers for these and other respiratory combinations. Cases reported as cold followed by pneumonia were coded as pneumonia only. Whatever diagnoses were coded as contributory causes of sickness were judged to be separate entities and not mere symptoms or stages in the progress of the primary cause of illness. The separate entities, however, were often sequelae of the original diagnoses, such as cold and indigestion, measles and pneumonia, scarlet fever and nephritis.

The causes of illness were necessarily those reported by the household informant and therefore represent what the patient or family thought was the matter. Correction of the original report was secured by submitting all cases seen by any practitioner to the attendant for verification or revision. The doctor's check on the diagnosis was obtained for 64 per cent of the cases seen by a practitioner, which amounted to a check of 51 per cent of all cases. Causes of death for fatal cases were obtained from the death certificates filed with the State health departments.

The causes were classified according to the International List of the Causes of Sickness and Death (1920 revision), with many subdivisions

of the diagnosis categories. A list of the causes of death is wholly inadequate for classifying illnesses, because mild but frequent causes of sickness fall in the same categories with infrequent severe diagnoses that are obscured by the large number of the former. The Manual of the International List as published by the Division of Vital Statistics of the United States Bureau of the Census was used to assist in the allocation of the diagnosis to the proper class.

Considering all illnesses in the sense of continuous periods of sickness, only 4.3 per cent of those reported in this study were designated as due to more than one cause. Although the number was small, it is important in interpreting the data to know the method of selecting the cause tabulated as primary. In this connection it should be noted that the word *primary* as generally used in discussions of the causes of death has two more or less logical meanings, viz (*a*) primary or first in time, as in measles and pneumonia, and (*b*) primary in importance as in heart disease and rheumatism. Because of this double meaning and of other difficulties, the determination of the primary of two or more causes of illness reported for a single case is often somewhat arbitrary, particularly when the schedule does not contain information as to the cause considered primary by the patient. The following general rules used in selecting the primary cause in the Hagerstown study (11) were also followed in this study:

(*a*) The *first* cause in order of occurrence, applied largely to acute conditions with common complications; such as influenza and pneumonia, measles and otitis media, scarlet fever and nephritis.

(*b*) *Acute* conditions ordinarily were given preference over an attack of some chronic condition. Thus, in case of grippe and chronic rheumatism, the grippe was considered primary.

(*c*) The condition or disease *most specifically associated with the period of sickness* was preferred over a minor condition which preceded or accompanied it. For example, tooth abscess and rheumatism; the latter was made primary. When it was difficult to determine the factual basis, the more serious condition was chosen.

(*d*) The *more specific* cause was given preference over a statement of a symptom.

(*e*) When none of the above rules could be applied, and the history of the individual gave no basis for decision, the condition mentioned first by the informant was made primary.

An exception to these rules was made in the classification of fatal cases, the causes of death being classified as primary or contributory strictly in accordance with the Manual of Joint Causes of Death published by the division of vital statistics of the United States Bureau of the Census. The data for the few deaths occurring in this study will have to be supplemented by official mortality reports and exact comparability is therefore necessary. In any consideration of case fatality or of the ratio of cases to deaths, both primary and contributory cases and deaths from a given cause must be considered and the

choice of the primary cause of the illness or of the death will not change the results.

THE CAUSES OF ILLNESS CLASSIFIED IN BROAD GROUPS

Table 11 shows the cases of illness classified in broad groups generally following the International List, but with some modifications. For each of the cause groups, numbers and rates are shown for cases with sole or primary diagnosis and for cases with diagnoses that were contributory to some other cause. Data are shown for the total number of cases, for cases that were sufficiently severe to cause the patient to lose one or more days from his usual occupation (disabling cases), and for cases that caused the patient to go to bed for one or more days. While it can not be claimed that all of the mild respiratory, digestive, skin, and other conditions were remembered and reported to the canvasser, it seems probable that the records are reasonably complete for all cases in which the patient lost some time from school, work, or other occupation, and it seems somewhat more probable that the reports are rather complete for cases that caused the patient to go to bed.

TABLE 11.—*Morbidity from groups of diseases in canvassed white families in 18 States during 12 consecutive months, 1928-1931*

[8,758 families including 39,185 individuals with 38,544 full-time years of observation. Of the individuals observed 19,199 were males, 19,930 were females and 56 of unknown sex]

Diagnosis groups, with the International List numbers, 1920 revision	Annual case rate per 1,000 persons observed			Number of cases			
	Total	Disabling	In bed	Total	Disabling	In bed	Onset of illness was prior to study year
All causes:							
Sole or primary	849.81	516.01	434.05	32,755	19,889	16,730	2,152
Contributory	39.75	29.55	26.54	1,532	1,139	1,023	282
Total	889.55	545.56	460.59	34,287	21,028	17,753	2,434
Respiratory diseases (11, 31, 97-107, 109):							
Sole or primary	348.46	238.58	212.87	13,431	9,196	8,205	343
Contributory	7.29	6.43	5.99	281	248	231	32
Total	355.75	245.02	218.87	13,712	9,444	8,436	375
Epidemic, endemic, and infectious diseases (1-42 exc. 11 and 31):							
Sole or primary	95.22	73.29	58.12	3,670	2,825	2,240	105
Contributory	1.45	1.35	1.25	56	52	48	5
Total	96.67	74.64	59.36	3,726	2,877	2,288	110
Other general diseases (43-69).							
Sole or primary	26.64	11.83	10.17	1,027	456	392	338
Contributory	2.96	1.92	1.66	114	74	64	45
Total	29.60	13.75	11.83	1,141	530	456	383
Diseases of the nervous system (70-84):							
Sole or primary	20.60	10.12	8.33	794	390	321	172
Contributory	2.49	1.63	1.48	96	63	57	37
Total	23.09	11.75	9.81	890	453	378	209
Diseases of the eyes and annexa (85):							
Sole or primary	11.08	4.07	1.17	427	157	45	37
Contributory	.54	.26	.13	21	10	5	2
Total	11.62	4.33	1.30	448	167	50	39

[1] Causing loss of one or more days from school or usual occupation whether or not gainfully employed. All cases with one or more days in bed are assumed to be disabling.

TABLE 11.—*Morbidity from groups of diseases in canvassed white families in 18 States during 12 consecutive months, 1928–1931*—Continued

Diagnosis groups, with the International List numbers, 1920 revision	Annual case rate per 1,000 persons observed			Number of cases			
	Total	Disabling	In bed	Total	Disabling	In bed	Onset of illness was prior to study year
Diseases of the ears and mastoid process (86):							
Sole or primary	18.76	9.50	7.29	723	366	281	38
Contributory	4.77	3.45	3.17	184	133	122	----------
Total	23.53	12.95	10.46	907	499	403	38
Diseases of the circulatory system (87–96):							
Sole or primary	21.43	11.00	9.34	826	424	360	247
Contributory	5.24	4.10	3.81	202	158	147	59
Total	26.67	15.10	13.15	1,028	582	507	306
Diseases of the teeth and gums (108):							
Sole or primary	10.59	2.78	1.82	408	107	70	15
Contributory	1.04	.47	.42	40	18	16	2
Total	11.62	3.24	2.23	448	125	86	17
Diseases of the digestive system (110–127):							
Sole or primary	87.04	51.47	45.66	3,355	1,984	1,760	247
Contributory	4.85	3.29	2.91	187	127	112	20
Total	91.89	54.77	48.57	3,542	2,111	1,872	267
Diseases of kidneys and urinary system (128–134).							
Sole or primary	13.59	7.13	6.02	524	275	232	81
Contributory	1.84	1.40	1.06	71	54	41	19
Total	15.44	8.54	7.08	595	329	273	100
Nonvenereal diseases of genital organs and annexa (135–142):							
Sole or primary	15.88	8.90	8.25	612	343	318	93
Contributory	1.63	1.27	1.25	63	49	48	18
Total	17.51	10.17	9.50	675	392	366	111
The puerperal state, including chronic conditions resulting from childbirth (143–150)							
Sole or primary	27.32	25.37	25.24	1,053	978	973	58
Contributory	1.56	1.30	1.30	60	50	50	14
Total	28.88	26.67	26.54	1,113	1,028	1,023	72
Diseases of the skin and cellular tissue (151–154):							
Sole or primary	34.79	9.88	4.57	1,341	381	176	96
Contributory	1.40	.96	.67	54	37	26	12
Total	36.19	10.84	5.24	1,395	418	202	108
Diseases of bones and organs of locomotion (155–158)							
Sole or primary	10.64	4.46	3.24	410	172	125	103
Contributory	.57	.36	.34	22	14	13	2
Total	11.21	4.83	3.58	432	186	138	105
Congenital malformations and other diseases of early infancy (159–163):							
Sole or primary	2.05	1.22	1.17	79	47	45	21
Contributory	.13	.13	.13	5	5	5	----------
Total	2.18	1.35	1.30	84	52	50	21
Accidents and other external causes (165–203):							
Sole or primary	74.67	35.96	22.44	2,878	1,386	865	41
Contributory	.23	.21	.13	9	8	5	----------
Total	74.90	36.17	22.57	2,887	1,394	870	41
Other and ill-defined causes (164, 204, 205):							
Sole or primary	31.06	10.43	8.35	1,197	402	322	117
Contributory	1.74	1.01	.86	67	39	33	15
Total	32.70	11.44	9.21	1,264	441	355	132

Considering all illnesses (sole or primary only), there was a total for the year of 850 per 1,000 persons under observation. The rate for illnesses that caused absence from work or school or other usual occupation for 1 or more days was 516, and for illnesses that caused the patient to go to bed was 434 per 1,000 persons. Expressed in another way, 61 per cent of the illnesses reported were disabling and 51 per cent involved one or more days in bed. Of all cases reported, 79 per cent were attended by a physician or other practitioner.

In Figure 2 illness rates from broad groups of causes have been plotted. Inasmuch as the Hagerstown survey is about the only preceding one of a comparable nature, the rates obtained in that study

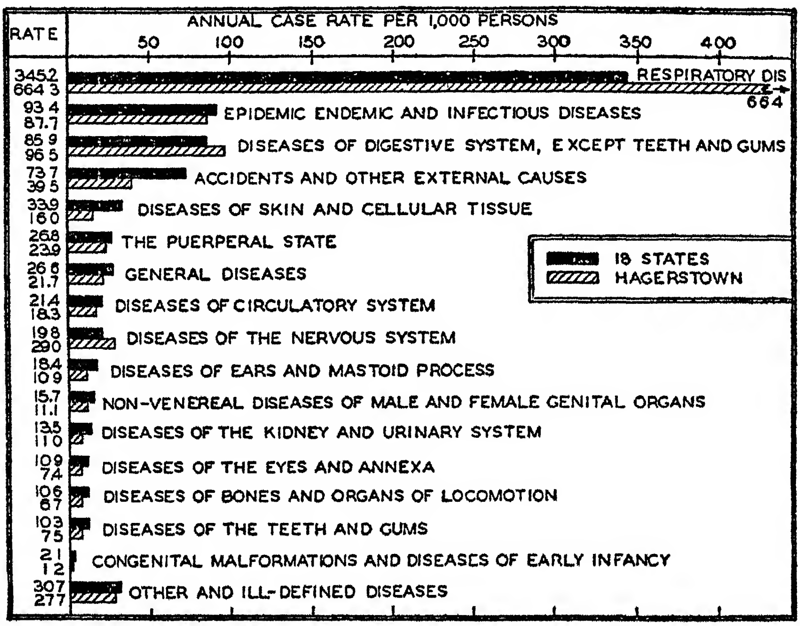

FIGURE 2.—Annual incidence of illness from broad groups of causes in canvassed families in 18 States and in the Hagerstown survey. (Primary causes only, data are exclusive of acute conditions with onset prior to study. A few changes have been made in the groups as published for Hagerstown (11) to secure comparability)

have been plotted for like groups of causes. To make the two sets of data comparable, the plotted rates represent sole or primary causes only and all *acute* conditions that had their onset prior to the study have been eliminated. The illness rate from all causes (sole or primary) as shown in Table 11 was 850 per 1,000 persons surveyed. When the acute cases with onset prior to the study are eliminated in accordance with the Hagerstown tabulation, the rate is 839 per 1,000, or 22 per cent less than the rate of 1,081 per 1,000 for the Hagerstown study.

In approximately 40 per cent of the Hagerstown cases the patient was confined to bed for one or more days. This would indicate that

the cases in bed amounted to a rate of 432 per 1,000 persons, or almost the same as the rate of 431 per 1,000 obtained in the present study.

The total rate for respiratory conditions in the present study, 315 per 1,000, was 48 per cent less than the Hagerstown rate of 664 per 1,000, but the nonrespiratory rate of 494 per 1,000 was 19 per cent greater than the Hagerstown rate of 416 per 1,000 for the same causes. In only two of the nonrespiratory disease groups, digestive and nervous, were the Hagerstown rates higher than the rates in the present study.

An examination of some of the detailed diagnoses included in the broad respiratory group indicates that the major differences between the two studies occur in the three diagnoses of colds and bronchitis, with the Hagerstown rate 2.5 times that found in the present study, influenza and grippe, with the Hagerstown rate 1.7 times that of the present study, and tonsillitis and other diseases of the pharynx and larynx, with a rate in Hagerstown 1.5 times the rate in the present study. Tonsillectomy, as might have been anticipated, was nearly three times as frequent in the present as in the Hagerstown study. The rates for pneumonia, asthma and hay fever, tuberculosis, and pleurisy were quite similar in the two studies.

Several circumstances appear to account for the higher Hagerstown respiratory rate: (*a*) The visits to the Hagerstown households were made at somewhat more frequent intervals, particularly during the last half of the study; (*b*) the Hagerstown study covered 28 months which included virtually all of 3 winters with their normally high respiratory rates, but only 2 summers with their normally low rates; (*c*) during the 28 months of the Hagerstown study 2 minor epidemics of respiratory disease occurred, those of February, 1922, and February, 1923, both of which were sufficiently important to be felt in nearly every section of the country (5). It has already been pointed out that although the larger influenza epidemic of 1928–29 fell within the period of the present study, only about one-fourth of the families were under observation during the epidemic months and the effect on the respiratory rate for the whole study would not be important.

The difference between the digestive-disease rate in the Hagerstown and the present study is relatively small but seems to be due largely to a higher rate for stomach conditions in the former data. The rate for diarrhea and enteritis, the other most frequent cause in this class, was higher in the present study than in the Hagerstown report.

A higher rate in Hagerstown for nervous diseases seems to be rather general for the various diagnoses in the nervous group, with neuralgia and neuritis and neurasthenia and nervousness accounting chiefly for the difference.

It might be worth while to examine a few of the causes in which the rates are higher in the present study than in Hagerstown. The accident rate was nearly twice as high as in Hagerstown. An examination of the specific causes of accidents indicates an increase in nearly every instance. The relative increase in automobile accidents is no greater than that in other causes. These increases can not be interpreted as changes with time, inasmuch as the present families are widely different from the Hagerstown families in many respects, including the size of the city in which they live.

The group of skin diseases also stands out with a rate in the present study that is more than twice the Hagerstown rate. An examination of specific causes indicates that nearly every skin condition is higher. Seasonally, skin diseases occur more frequently in the summer months and the disproportionately small number of summer months in the Hagerstown study may have been a factor in the low rate. Of perhaps more importance is the additional emphasis in the present study laid upon the reporting of all conditions for which medicines were purchased. The fact that skin diseases were particularly frequent in the higher-income groups lends color to this assumption (8).

In the present study a considerably higher proportion of the cases were attended by a physician. Considering all causes together, 79 per cent of the cases were attended by a practitioner, as compared with 47 per cent in Hagerstown. For respiratory diseases, the figures are 70 per cent for this study and only 35 per cent for Hagerstown. For nonrespiratory diseases 85 per cent of the cases were attended as against 65 per cent in Hagerstown. Even with wide differences in medical practice, these figures probably confirm the indications of the proportion of cases in bed, viz, that the Hagerstown canvasses secured reports on a larger proportion of the mild cases, particularly mild respiratory conditions, than was true in the present study.

SPECIFIC CAUSES OF ILLNESS

The observed population in the 18 States was sufficient to afford data on the incidence of some of the more rare conditions. Figure 3 shows sickness rates for all specific causes having a rate of 1.0 or higher per 1,000 population. The diagnoses used are as specific as could be obtained from the character of the data. Respiratory diseases have been divided into a number of groups, but it is impossible to separate chest and bronchial conditions from coryza because of a large group of colds without further qualification that may fall in either group. Similarly, diseases of the pharynx and larynx are in one group because of the large number of sore throats that may belong in either category.

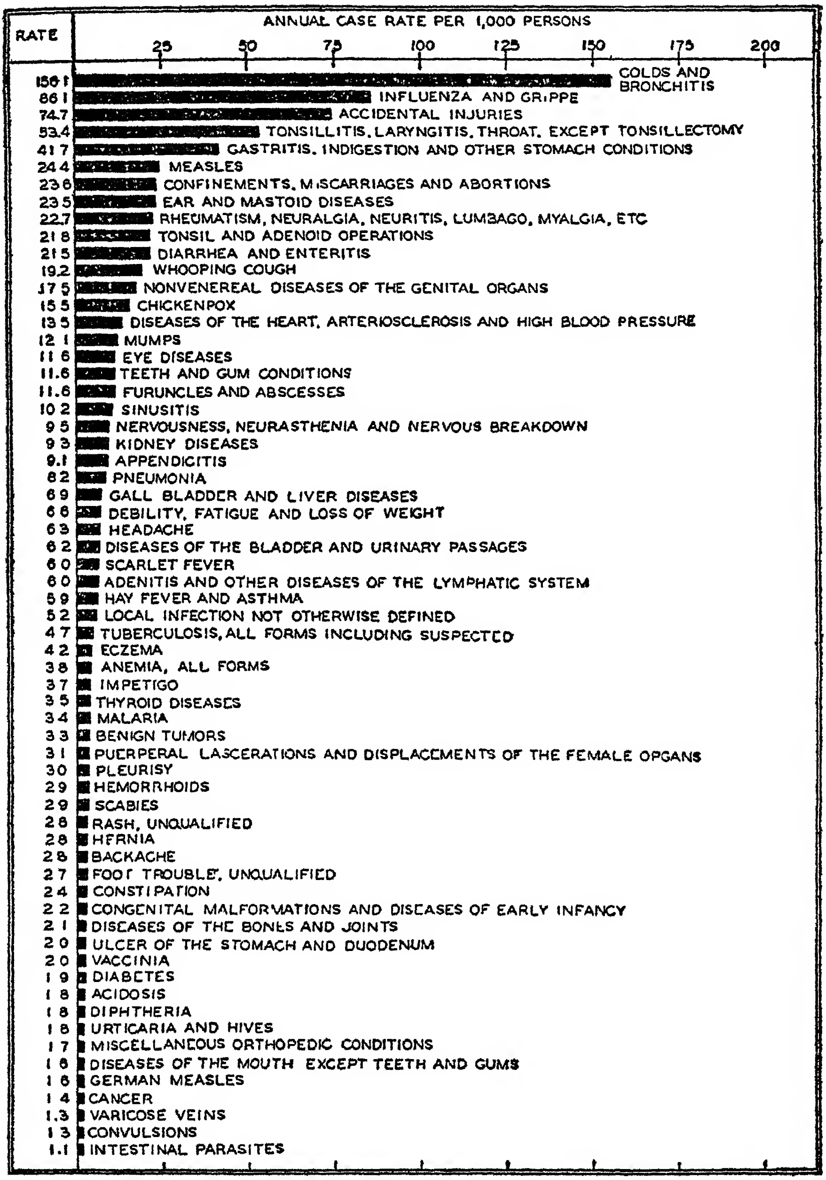

FIGURE 3.—Total annual incidence of specific conditions in surveyed families in 18 States, 1928–1931. (Primary and contributory causes)

Table 12.—*Morbidity from certain diseases in canvassed white families in 18 States during 12 consecutive months, 1928–1931*

[8,758 families including 39,185 individuals with 38,544 full-time years of observation. Of the individuals [illegible]]

Diagnoses, with the International List numbers, 1920 revision	Annual case rate per 1,000 persons observed			Number of cases				
	Sole, primary, or contributory			Sole, primary, or contributory			Contributory to some other diagnosis	Onset of illness was prior to study year
	Total	Disabling[1]	In bed	Total	Disabling[1]	In bed		
Respiratory diseases (11, 31, 97–107, 109):								
Influenza and grippe (11)	86.14	76.61	72.96	3,320	2,953	2,812	14	38
Bronchitis and chest colds (99)	48.85	32.35	28.93	1,883	1,247	1,115	34	32
Coryza, head colds (part of 97)	58.82	25.66	20.60	2,267	989	794	8	14
Colds, unqualified (part of 107)	48.44	28.12	21.85	1,867	1,084	842	19	10
Vincent's angina (part of 109)	1.04	.39	.26	40	15	10	2	3
Tonsillitis (part of 109)	23.27	19.33	17.77	897	745	685	11	3
Quinsy (part of 109)	1.82	1.56	1.40	70	60	54	3	1
Sore throat (part of 109)	17.02	8.61	6.46	656	332	249	9	2
Tonsillectomy and adenoidectomy (part of 109)	21.82	21.33	21.20	841	822	817	16	20
Other pharynx and tonsil conditions (part of 109)	4.49	2.75	2.40	173	106	96	14	7
Laryngitis (part of 98)	2.83	1.58	1.40	100	61	54	2	4
Croup (part of 98)	2.91	1.95	1.63	112	75	63	2	--------
Pneumonia, all forms (100, 101)	8.20	8.20	8.20	316	316	316	48	9
Sinusitis (part of 97)	10.25	5.14	4.02	395	198	155	35	43
Asthma and hay fever (105, part of 107)	5.86	2.49	2.00	226	96	77	18	67
Pleurisy (102)	2.96	2.70	2.44	114	104	94	26	5
Active respiratory tuberculosis (part of 31)	2.72	2.02	1.82	105	78	70	2	76
Suspected respiratory tuberculosis (part of 31)	1.22	.54	.47	47	21	18	7	22
Other respiratory diseases	7.11	3.68	2.98	274	142	115	11	19
Epidemic, endemic and infectious dis. (1–42 exc. 11, 31):								
Typhoid and paratyphoid fever (1)	.39	.39	.30	15	15	15	--------	2
Malaria (5)	8.35	2.80	2.72	120	108	105	2	1
Small pox (6)	.39	.31	.31	15	12	12	--------	--------
Measles (7)	24.39	22.65	22.00	940	873	848	13	6
German measles (part 25)	1.58	1.27	.86	61	49	33	--------	--------
Whooping cough (9)	19.17	9.11	3.61	739	351	139	2	27
Mumps (13)	12.09	10.38	7.58	466	400	292	9	1
Chickenpox (part 25)	15.46	11.99	8.43	596	462	325	8	6
Scarlet fever (8)	6.02	5.86	5.60	232	226	216	3	12
Diphtheria (10)	1.82	1.79	1.79	70	69	69	--------	7
Poliomyelitis, acute anterior (part 22)	.18	.18	.18	7	7	7	--------	2
Erysipelas (21)	.67	.60	.57	26	23	22	--------	--------
Tuberculosis, non-respiratory (32–37)	.78	.62	.54	30	24	21	3	19
Syphilis (38)	.67	.18	.10	26	7	4	2	15
Gonorrhea (40)	.36	.16	.16	14	6	6	--------	4
General infection, blood poisoning (part 41)	.80	.67	.49	31	26	19	7	2
Local infection (cause unknown) (part 41)	5.24	2.93	1.92	202	113	74	5	2
Vaccinia (excl. of vaccinations without illness) (part of 42)	1.97	1.87	1.32	76	72	51	--------	1
Other diseases of this group	1.32	.88	.78	51	34	30	2	8
Other general diseases (43–69):								
Cancer (43–49)	1.35	1.01	.93	52	39	36	--------	30
Benign tumors, exclusive of female organs (50)	3.29	1.25	.91	127	48	35	10	21
Rheumatism, acute and chronic (51, 52)	11.39	6.20	5.32	439	239	205	44	117
Diabetes (57)	1.87	.91	.83	72	35	32	2	53
Anemia, all forms (58)	3.79	1.32	.99	146	51	38	30	44
Diseases of the thyroid gland (60)	3.48	1.06	.96	134	41	37	8	84
Acidosis (part 69)	1.82	.73	.65	70	28	25	8	7
Other general diseases	2.62	1.27	1.25	101	49	48	12	27
Diseases of the nervous system (70–84):								
Cerebral hemorrhage, apoplexy (74)	.83	.80	.80	32	31	31	8	7
Paralysis (75)	.86	.57	.47	33	22	18	6	21
Epilepsy (78)	.67	.29	.21	26	11	8	2	22
Convulsions (79, 80)	1.25	.96	.91	48	37	35	7	1
Chorea (81)	.42	.29	.23	16	11	9	1	5
Neuralgia and neuritis (82)	6.98	3.11	2.39	269	120	92	25	45

[1] Causing loss of one or more days from school or usual occupation whether or not gainfully employed. All cases with one or more days in bed are assumed to be disabling.

TABLE 12.—*Morbidity from certain diseases in canvassed white families in 18 States during 12 consecutive months, 1928–1931*—Continued

Diagnoses, with the International List numbers, 1920 revision	Annual case rate per 1,000 persons observed			Number of cases				
	Sole, primary, or contributory			Sole, primary, or contributory			Contributory to some other diagnosis	Onset of illness was prior to study year
	Total	Disabling	In bed	Total	Disabling	In bed		
Diseases of the nervous system—Contd.								
Nervousness (part 84)	6.46	2.10	1.71	249	81	66	23	43
Neurasthenia, nervous breakdown (part 84)	3.06	2.05	1.71	118	79	66	9	15
Other nervous diseases	2.57	1.58	1.38	99	61	53	15	30
Diseases of the eyes and annexa (85):								
Sty (part 85)	1.66	.41	.16	64	17	6	3	1
Conjunctivitis, pinkeye, sore eye (part 85)	5.40	2.51	.42	208	98	16	6	------
Other eye conditions	4.57	1.35	.73	176	52	28	12	33
Diseases of ears and mastoid process (86):								
Earache (part 86)	4.00	1.89	1.22	154	73	47	39	1
Otitis media (part 86)	13.44	8.30	6.88	518	320	265	107	8
Other ear conditions (part 86)	4.75	1.50	1.12	183	58	43	30	22
Diseases of mastoid process (part 86)	1.35	1.25	1.25	52	48	48	8	7
Diseases of the circulatory system (87–96):								
Diseases of the heart (87–90)	8.72	5.84	5.06	336	225	195	52	153
Hemorrhoids (part 93)	2.88	1.06	.86	111	41	33	8	20
Varicose veins or ulcer (part 93)	1.32	.44	.34	51	17	13	5	24
Diseases of lymphatic system (94)	6.02	3.81	3.22	232	147	124	52	5
Nose bleed, epistaxis (part 95)	.86	.36	.18	33	14	7	8	------
Arteriosclerosis and high blood pressure (part 91, part 96)	4.80	2.44	2.39	185	94	92	55	85
Other circulatory diseases	2.08	1.14	1.12	80	44	43	22	19
Diseases of the teeth and gums (part of 108)	11.62	3.24	2.23	448	125	86	40	17
Diseases of the digestive system (part of 108, 110–127):								
Diseases of mouth except teeth and gums (part of 108)	1.58	.42	.34	61	16	13	5	3
Ulcers of stomach and duodenum (111)	1.97	1.22	.99	76	47	38	------	27
Indigestion, upset stomach, nausea (part of 112)	31.81	17.90	15.18	1,226	690	585	57	26
Biliousness (part of 205)	3.76	2.80	2.52	145	108	97	7	1
Other and ill-defined stomach conditions (part of 112)	6.17	2.67	1.92	238	103	74	16	43
Diarrhea and enteritis (113, 114)	21.51	12.40	11.47	829	478	442	34	25
Intestinal parasites except hookworm (116)	1.12	.34	.26	43	13	10	1	3
Appendicitis (117)	9.13	8.12	7.94	352	313	306	29	20
Hernia, intestinal obstruction (118)	2.75	1.79	1.69	106	69	65	5	26
Constipation (part of 119)	2.39	.52	.34	92	20	13	6	32
Biliary calculi (123)	1.09	.91	.91	42	35	35	1	4
Cholecystitis (part of 124)	3.71	2.49	2.31	143	96	89	5	30
Jaundice (part of 124)	.80	.52	.42	31	20	16	3	------
Other and ill-defined liver conditions (part of 124)	1.25	.60	.39	48	23	15	4	12
Other and ill-defined diseases of digestive system	2.85	2.08	1.92	110	80	74	14	13
Diseases of kidneys and urinary system (128–134):								
Nephritis, acute and chronic (128, 129)	2.08	1.53	1.40	80	59	54	12	23
Kidney trouble, unqualified (part of 131)	3.94	1.97	1.43	152	76	55	27	25
Pyelitis (part of 131)	2.41	1.58	1.43	93	61	55	8	6
Other kidney conditions (part of 131)	.83	.49	.44	32	19	17	6	5
Calculi of urinary passages (132)	1.17	.96	.86	45	37	33	------	3
Cystitis (part of 133)	2.93	1.32	1.01	113	51	39	10	14
Other diseases of bladder, diseases of urethra (part of 133, 134)	2.08	.67	.52	80	26	20	8	24
Nonvenereal diseases of genital organs and annexa (135–142):								
Diseases of the prostate (135)	.80	.47	.42	31	18	16	5	6
Circumcision (part 136)	2.46	1.95	1.89	95	75	73	15	2
Nonvenereal diseases of male genital organs (part 136)	.52	.21	.16	20	8	6	2	1
Cysts and tumors of ovary and uterus (137, 139)	1.19	.99	.99	46	38	38	4	14
Salpingitis and pelvic abscess (138)	.83	.70	.70	32	27	27	7	4
Menstrual disorders (140, part 141)	5.99	3.22	2.91	231	124	112	15	40

Table 12.—*Morbidity from certain diseases in canvassed white families in 18 States during 12 consecutive months, 1928-1931*—Continued

Diagnoses, with the International List numbers, 1920 revision	Annual case rate per 1,000 persons observed			Number of cases				
	Sole, primary, or contributory			Sole, primary, or contributory			Contributory to some other diagnosis	Onset of illness was prior to study year
	Total	Disabling	In bed	Total	Disabling	In bed		
Nonvenereal diseases of genital organs and annexa—Continued.								
Other and ill-defined nonvenereal diseases of female organs (part 141, 142)	5.71	2.65	2.44	220	102	94	15	44
Puerperal state, including chronic conditions resulting from childbirth (143-150):								
Abortions, miscarriages and stillbirths (part 143)	3.87	3.84	3.70	149	148	146	4	7
Live births (part 145, 149)	19.74	19.74	19.74	761	761	761	--------	9
Disturbances of pregnancy without loss of fetus (part 143)	.54	.39	.39	21	15	15	--------	--------
Acute complications of pregnancy or childbirth (144, 146, 147, 148, part 149)	.62	.54	.54	24	21	21	16	8
Puerperal diseases of the breast (150)	.99	.62	.62	38	24	24	5	1
Lacerations, displacements, etc.:								
Due or aggravated by births during study (part 145)	.47	.29	.29	18	11	11	4	--------
Results of births prior to study (part 145, part 149)	2.65	1.25	1.17	102	48	45	32	52
Diseases of skin and cellular tissue (151-154):								
Furuncle (152)	8.28	2.78	1.53	319	107	59	9	5
Abscesses and ulcers (153, part 151)	3.29	1.70	1.27	127	69	49	10	10
Impetigo (part 154)	3.74	1.01	.13	144	39	5	6	5
Urticaria, hives (part 154)	1.79	.73	.60	69	28	23	7	2
Scabies (part 154)	2.88	1.17	.10	111	45	4	--------	5
Eczema (part 154)	4.15	.75	.29	160	29	11	6	32
Other and ill-defined skin conditions	12.06	2.62	1.32	465	101	51	16	49
Diseases of bones and organs of locomotion (155-158).								
Diseases of bones and joints, except tuberculosis and rheumatism (155, 156)	2.13	.91	.75	82	35	29	8	22
Lumbago (part 158)	3.27	2.15	1.61	126	83	62	4	2
Wry neck, myalgia, myositis, and other muscular pains (part 158)	1.06	.26	.23	41	10	9	5	2
Ill-defined orthopedic conditions (part 205)	1.71	.75	.54	66	29	21	2	45
Other diseases of the organs of locomotion	3.04	.75	.44	117	29	17	3	34
Congenital malformations and other diseases of early infancy (159-163):								
Congenital malformations (159)	1.17	.54	.49	45	21	19	-	18
Other diseases of early infancy (160-163)	1.01	.80	.80	39	31	31	5	3
Accidents and other external causes (165-203):								
Poisoning by ivy, oak, and other plants (part 177)	2.49	.88	.44	96	34	17	-	-----
Other accidental poisonings (175, 176, part 177)	3.09	1.69	1.50	119	65	58	--------	-
Automobile accidents (18sc)	4.96	4.02	3.55	191	155	137	-----	9
Accidental burns (179)	4.02	1.58	.91	155	61	35	2	1
Accidental injuries by cutting or piercing instruments (184)	7.60	2.88	1.58	293	111	61	---	2
Accidental falls (185)	5.11	2.46	1.76	197	95	68	2	1
Other accidental injuries	47.45	22.52	12.69	1,829	868	489	5	28
Homicides and attempted homicides (197-200)	.05	.03	.03	2	1	1	--	-
Suicides and attempted suicides (165-174)	.13	.10	.10	5	4	4	---	-----
Other and ill-defined causes (164, 204, 205):								
Foot trouble (part 205)	2.70	----	----	104	---			2
Headache (part 205)	6.30	3.55	2.91	243	137	112	7	17
Backache (part 205)	2.75	.86	.57	106	33	22	4	6
Debility, fatigue, exhaustion, malnutrition, loss of weight (part 205)	6.62	1.87	1.43	255	72	55	20	47
Rash, unqualified (part 205)	2.75	.96	.75	106	37	29	9	1
Other and unknown causes of sickness	11.67	4.20	3.55	450	162	137	27	59

Three of the four most frequent specific causes of illness are respiratory. For conditions other than respiratory, accidental injuries head the list, and indigestion and other stomach disorders come next to respiratory conditions among diseases exclusive of accidents. Next to indigestion but with considerably smaller rates come measles, confinements,[2] and ear diseases, with almost identical rates for the three. Figure 3, it must be remembered, is based solely on the *frequency* of cases, and serious conditions like pneumonia, heart diseases, kidney diseases, appendicitis, etc., fall rather far down in the list. The chart does not show the seriousness of a case but merely the frequency with which it occurred. Later studies will consider the severity of these diseases as measured in days of illness, days in bed, the extent and kind of medical care, etc.

With respect to the incidence of the communicable diseases of children, such as measles, whooping cough, etc., a 12-month record ordinarily would not give any indication of the expected frequency of such conditions, because they vary widely from year to year. However, these data come from 130 different localities, and the high epidemic rates in one place would be averaged with the low rates of another, because the cyclical waves in the incidence of these diseases do not occur synchronously in different communities. The rates for such conditions in this study will therefore approach the true average expectancy much closer than in a 12-month period in a single locality.

Ninth in the list of diseases, with a rate of 23 per 1,000, is a group of rheumatic and neuralgic conditions. Technically, the diagnoses included in this category differ a great deal, but it was felt that as reported by lay persons the most accurate statement of their frequency would be obtained by combining similar aches and pains into one group. Table 12 shows these and other diagnoses separately and in greater detail than is shown in the graphs, and the composition of the group can be obtained from that source.

In Figure 4 there is eliminated from consideration all illnesses that were so mild that they did not keep the patient from his usual duties, but the chart is still based on the *frequency* of cases and in no way represents the severity of an individual diagnosis. The purpose of setting up this new alignment of cases according to frequency was to indicate the chief causes of illness of sufficient severity to involve loss of time from work, school, play, or other occupation, particularly

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[2] In this paper all rates are expressed as per 1,000 *total* population. In many instances the cases of a specific diagnosis are limited almost solely to certain groups of the population. Examples are the communicable diseases of children that occur largely under 15 years of age, and confinements, miscarriages, and abortions that occur almost entirely among married women under 50 years of age. The purpose of the rates in the present paper is to measure the importance of a specific condition not to any subgroup of the population but to the whole population, and the proper base for the rates, therefore, seems to be the total population of both sexes. Later papers will consider rates for various subgroups of the population.

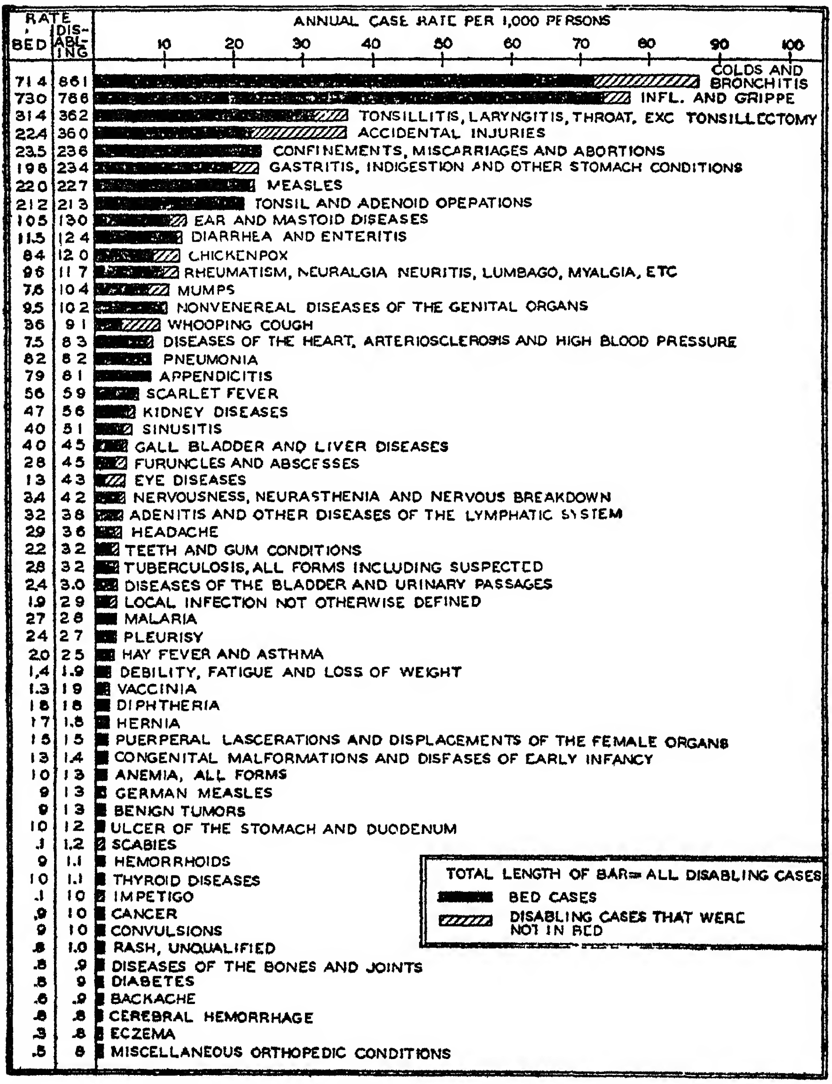

FIGURE 4.—Annual incidence of disabling and of bed cases of illness in surveyed families in 18 States, 1928–1931 (Primary and contributory causes)

because it was felt that in a survey of this kind practically all of such cases would be reported to the investigators. In this chart the bars representing case rates have been shaded in two ways, the black portion of the bar representing the frequency of cases that caused the patient to go to bed for one or more days, and the cross-hatched portion the frequency of disabling cases that did not cause the patient to go to bed. The total length of the bar, therefore, represents the rate for all disabling cases whether or not the patient was in bed. It will be noted that in the majority of diagnoses nearly all of the bar is black, which indicates that the number of disabling cases in which the patient was not in bed for one or more days is small. Figure 4 shows sickness-frequency rates for all specific causes having a rate of 0.75 or higher per 1,000 for disabling cases.

In spite of the usual designation of "minor" respiratory diseases, the three most frequent diagnoses for disabling illness and for illness with one or more days in bed are in the minor respiratory class. The fourth most frequent disabling condition is accidents; but in terms of cases in which the patient was in bed, this cause is exceeded by confinements. Indigestion, measles, and tonsil and adenoid operations are the other three diagnoses with rates for disabling cases above 20 per 1,000, with the next rate, ear and mastoid conditions, at 13 per 1,000.

SUMMARY

A total of 8,758 white families in 130 localities in 18 States were observed for illness for a period of 12 consecutive months between February, 1928, and June, 1931. Each family was visited at intervals of 2 to 4 months to obtain the sickness record.

The surveyed families include representation from nearly all geographic sections, from rural, urban, and metropolitan areas, from all income classes, and of both native- and foreign-born persons. The proportions of these various elements included are not identical with those included in the population of the United States, but the variations are not generally large. In other respects also the surveyed group is not dissimilar to families in the general white population of the United States.

An illness rate of 850 per 1,000 persons was found. Although considerably less than the Hagerstown rate of 1,081 per 1,000, the difference is largely in the minor respiratory conditions, nearly all of the nonrespiratory disease groups having a higher rate in the present study than in the Hagerstown data. (Fig. 2.)

Records obtained at intervals of 2 to 4 months could not be expected to contain all the minor respiratory and digestive illnesses, but might be expected to be reasonably complete for all cases causing loss of time from work or school or causing the patient to go to bed.

For this reason, rates were computed to show the frequency of these types of cases independent of the total cases reported.

Illnesses that caused loss of time from work, school, or other occupation amounted to 516 per 1,000 persons.

Illnesses in which the patient was confined to bed for one or more days amounted to 434 per 1,000 persons. This figure is almost identical with the finding of the Hagerstown study.

Minor respiratory conditions are the most frequent causes of illness, whether one considers the total rate (fig. 3), the rate for disabling cases, or the rate for bed cases (fig. 4).

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COURT DECISION RELATING TO PUBLIC HEALTH

Action for carbon bisulphide poisoning held barred by statute of limitations.—(Washington Supreme Court; Calhoun *v.* Washington Veneer Co., 15 P. (2d) 943; decided Nov. 15, 1932.) An action was brought to recover damages on account of carbon disulphide poisoning alleged to have been caused by employment in a room improperly ventilated in violation of the factory act. The supreme court stated that, in the condition of the law at the time, recovery could be had, if at all, only under the factory act. The employee's cause of action was held to have accrued when he ceased working in the room alleged to have been improperly ventilated and, because his action was not commenced within the period prescribed by the statute of limitations, the court held that it was barred. After the commencement of his action the employee died, and the causes of action set up by the administratrix of his estate were also held to be barred.

DEATHS DURING WEEK ENDED MARCH 4, 1933

[From the Weekly Health Index issued by the Bureau of the Census, Department of Commerce]

	Week ended Mar. 4, 1933	Corresponding week, 1932
Data from 85 large cities of the United States:		
Total deaths	8,229	9,370
Deaths per 1,000 population, annual basis	11.5	13.4
Deaths under 1 year of age	609	694
Deaths under 1 year of age per 1,000 estimated live births [1]	53	59
Deaths per 1,000 population, annual basis, first 9 weeks of year	12.5	12.3
Data from industrial insurance companies:		
Policies in force	68,947,917	73,920,205
Number of death claims	15,423	15,815
Death claims per 1,000 policies in force, annual rate	11.7	11.2
Death claims per 1,000 policies, first 9 weeks of year, annual rate	11.4	10.0

[1] 1933, 81 cities; 1932, 78 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks ended March 11, 1933, and March 12, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended March 11, 1933, and March 12, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Mar. 11, 1933	Week ended Mar. 12, 1932	Week ended Mar. 11, 1933	Week ended Mar. 12, 1932	Week ended Mar. 11, 1933	Week ended Mar. 12, 1932	Week ended Mar. 11, 1933	Week ended Mar. 12, 1932
New England States:								
Maine	------	2	1	17	2	445	0	0
New Hampshire	------	2	3	------	------	13	0	0
Vermont	1	------	------	------	21	32	0	0
Massachusetts	28	29	11	43	355	481	0	0
Rhode Island	2	3	5	------	------	451	0	2
Connecticut	5	1	7	28	328	236	2	0
Middle Atlantic States:								
New York	70	124	[1] 30	[1] 324	3,519	2,643	7	8
New Jersey	23	39	34	206	1,504	188	2	1
Pennsylvania	78	131	------	------	1,212	1,925	7	5
East North Central States:								
Ohio	43	64	215	492	529	1,879	0	2
Indiana	42	64	83	200	85	45	3	10
Illinois	31	88	68	190	276	252	19	10
Michigan	19	33	9	146	1,531	602	7	2
Wisconsin	5	13	137	874	412	418	1	3
West North Central States:								
Minnesota	5	9	2	------	1,102	14	0	0
Iowa	12	14	------	------	14	------	2	3
Missouri	27	32	17	10	213	83	4	0
North Dakota	7	1	26	------	18	25	1	4
South Dakota	5	4	------	10	6	15	0	2
Nebraska	7	11	3	4	22	38	1	0
Kansas	4	15	6	9	237	126	4	0
South Atlantic States:								
Delaware	1	1	------	3	2	------	0	0
Maryland [2]	8	26	70	219	6	80	0	2
District of Columbia	3	9	3	14	5	1	0	3
Virginia	18	------	------	------	647	------	2	------
West Virginia	12	18	43	375	106	626	0	2
North Carolina	12	29	105	76	371	439	2	8
South Carolina [3]	5	8	918	993	204	95	0	0
Georgia [3]	8	7	445	185	20	22	2	0
Florida	7	------	13	2	25	1	0	0
East South Central States:								
Kentucky	13	11	77	384	67	76	2	1
Tennessee	9	19	85	1,403	33	182	8	3
Alabama [3]	15	24	113	87	41	5	1	0
Mississippi	7	10	------	------	------	------	1	0
West South Central States:								
Arkansas	4	4	49	144	119	1	2	1
Louisiana	23	31	56	12	40	18	1	0
Oklahoma [4]	21	22	141	776	71	24	0	1
Texas [3]	48	59	135	410	710	26	1	0

See footnotes at end of table

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended March 11, 1933, and March 12, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Mar. 11, 1933	Week ended Mar. 12, 1932	Week ended Mar. 11, 1933	Week ended Mar. 12, 1932	Week ended Mar. 11, 1933	Week ended Mar. 12, 1932	Week ended Mar. 11, 1933	Week ended Mar. 12, 1932
Mountain States:								
Montana		2	15	182	94	81	0	1
Idaho	1		3	2	94	1	0	0
Wyoming		2	1	1	1	2	0	1
Colorado	2	7	47		3	145	7	0
New Mexico	11	16	2	3	12	121	1	1
Arizona	3	1		117	34	2	0	2
Utah [2]	1	1	5		4		2	0
Pacific States:								
Washington	4	7			3	549	0	1
Oregon	3	1	73	233	108	160	0	0
California	49	49	107	170	985	517	3	4
Total	702	1,043	3,163	8,494	15,410	13,085	95	78

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Mar. 11, 1933	Week ended Mar. 12, 1932	Week ended Mar. 11, 1933	Week ended Mar. 12, 1932	Week ended Mar. 11, 1933	Week ended Mar. 12, 1932	Week ended Mar. 11, 1933	Week ended Mar. 12, 1932
New England States:								
Maine	0	0	14	35	0	0	2	0
New Hampshire	0	0	50	32	0	0	1	0
Vermont	0	0	15	22	0	6	0	1
Massachusetts	1	1	393	489	0	0	0	2
Rhode Island	0	0	25	53	0	0	0	0
Connecticut	0	0	115	109	0	4	1	1
Middle Atlantic States:								
New York	0	1	1,009	1,821	0	2	10	7
New Jersey	0	2	382	334	0	0	4	1
Pennsylvania	0	0	956	747	0	0	9	6
East North Central States:								
Ohio	0	0	967	487	2	27	8	2
Indiana	0	1	197	133	1	13	1	4
Illinois	1	0	471	396	26	24	1	3
Michigan	1	1	558	460	2	8	4	7
Wisconsin	0	1	160	102	9	0	1	11
West North Central States:								
Minnesota	0	1	88	110	0	2	0	1
Iowa	0	0	53	63	49	20	1	3
Missouri	0	0	95	55	0	7	1	4
North Dakota	0	0	21	25	5	2	1	0
South Dakota	1	0	24	13	0	0	3	1
Nebraska	0	0	37	38	1	12	0	3
Kansas	0	0	58	55	0	2	2	3
South Atlantic States:								
Delaware	0	0	15	15	0	0	0	1
Maryland [2]	1	0	113	132	0	0	14	4
District of Columbia	0	0	21	24	0	0	0	3
Virginia	1		59		4	1	8	
West Virginia	0	1	81	29	0	4	4	12
North Carolina	1	0	31	54	0	1	8	7
South Carolina [3]	0	1	8	7	0	0	0	2
Georgia [3]	0	0	9	5	14	0	8	10
Florida	1	0	5	2	0	0	0	5
East South Central States:								
Kentucky	0	0	50	76	0	0	9	9
Tennessee	1	0	49	31	0	7	5	9
Alabama [3]	0	0	14	15	1	8	1	13
Mississippi	1	0	5	6	0	17	5	5
West South Central States:								
Arkansas	0	0	19	2	22	27	1	0
Louisiana	0	0	18	16	0	2	5	13
Oklahoma [4]	1	0	31	32	9	12	0	4
Texas [3]	0	0	44	88	9	46	8	4

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended March 11, 1933, and March 12, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Mar. 11, 1933	Week ended Mar. 12, 1932	Week ended Mar. 11, 1933	Week ended Mar. 12, 1932	Week ended Mar. 11, 1933	Week ended Mar. 12, 1932	Week ended Mar. 11, 1933	Week ended Mar. 12, 1932
Mountain States:								
Montana	0	0	16	17	1	0	7	4
Idaho	0	0	0	2	4	0	0	0
Wyoming	0	0	4	2	0	1	0	0
Colorado	0	0	43	33	1	2	1	0
New Mexico	0	0	8	10	0	0	0	1
Arizona	0	1	8	3	0	1	0	0
Utah [2]	0	0	19	119	0	0	1	0
Pacific States:								
Washington	0	0	52	26	4	10	3	0
Oregon	0	0	10	28	2	11	2	3
California	2	6	217	130	39	13	9	7
Total	13	17	6,587	6,440	205	292	139	176

[1] New York City only.
[2] Week ended Friday.
[3] Typhus fever, week ended Mar. 11, 1933, 8 cases: 1 case in South Carolina, 3 cases in Georgia, 2 cases in Alabama, and 2 cases in Texas.
[4] Figures for 1933 are exclusive of Oklahoma City and Tulsa and for 1932 are exclusive of Tulsa only.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week:

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
January, 1933										
California	18	236	2,780	1	652	2	9	789	111	37
Delaware		21	78		5		0	46	0	
District of Columbia	4	37	45		13	1	0	86	0	1
Mississippi	3	319	11,309	854	757	147		46	7	13
South Carolina		143	13,534	437	156	150	2	29	9	12
South Dakota	4	20	878		31	0	0	90	11	270
February, 1933										
Colorado	11	16	330		27		0	154	0	2
Connecticut	4	20	345	1	661		0	483	6	3
Delaware	1	17	21		13		0	31	0	
Massachusetts	1	96	105	2	982	1	1	1,490	0	4
New Mexico	1	44	89		24		0	46	0	5
Vermont		12			17		0	77	2	2

January, 1933	Cases
Actinomycosis:	
California	1
South Dakota	1
Botulism:	
California	2
Chicken pox:	
California	1,793
Delaware	50
District of Columbia	128
Mississippi	441
South Carolina	216
South Dakota	82
Dengue:	
Mississippi	5
South Carolina	15
Diarrhea:	
South Carolina	329
Dysentery:	
California (amebic)	3
California (bacillary)	12
Mississippi (amebic)	50
Food poisoning:	
California	12
German measles:	
California	24
Granuloma, coccidioidal:	
California	4
Hookworm disease:	
Mississippi	387
South Carolina	93
Leprosy:	
California	1
Lethargic encephalitis:	
California	3
South Carolina	7
Mumps:	
California	539
Delaware	6
Mississippi	209
South Carolina	60
South Dakota	8
Ophthalmia neonatorum:	
California	2
Mississippi	11
South Carolina	20
Paratyphoid fever:	
South Carolina	2
Puerperal septicemia:	
Mississippi	24
Rabies in animals:	
California	39
Delaware	3
Mississippi	13
South Carolina	11

	Cases
Rabies in man:	
South Dakota	1
Septic sore throat:	
California	12
South Dakota	3
Tetanus:	
California	3
Trachoma:	
California	9
Mississippi	6
South Dakota	3
Trichinosis:	
California	3
Tularaemia:	
Mississippi	1
South Carolina	4
Typhus fever:	
California	2
Delaware	1
South Carolina	3
Undulant fever:	
California	4
Delaware	1
Mississippi	2
South Carolina	1
Whooping cough:	
California	1,059
Delaware	3
District of Columbia	16
Mississippi	583
South Carolina	153
South Dakota	62

February, 1933

	Cases
Anthrax:	
Massachusetts	3
Chicken pox:	
Colorado	316
Connecticut	411
Delaware	53
Massachusetts	1,106
New Mexico	105
Vermont	216
Conjunctivitis:	
New Mexico	5
Dysentery:	
Connecticut (bacillary)	5
German measles:	
Connecticut	12
Massachusetts	51
New Mexico	5
Impetigo contagiosa:	
Colorado	1
Lead poisoning:	
Connecticut	1
Massachusetts	1
Lethargic encephalitis:	
Connecticut	2
Massachusetts	4
Mumps:	
Colorado	382
Connecticut	251
Delaware	1
Massachusetts	718
New Mexico	103
Vermont	297
Ophthalmia neonatorum:	
Connecticut	1
Massachusetts	44
New Mexico	1
Puerperal septicemia:	
Delaware	1

	Cases
Rabies in animals:	
Connecticut	4
Septic sore throat:	
Colorado	1
Connecticut	3
Massachusetts	40
Tetanus:	
Connecticut	1
Trachoma:	
Connecticut	1
Massachusetts	4
New Mexico	1
Trichinosis:	
Connecticut	3
Massachusetts	21
Typhus fever:	
Delaware	2
Undulant fever:	
Connecticut	4
Vermont	1
Vincent's angina:	
Colorado	2
New Mexico	3
Whooping cough:	
Colorado	53
Connecticut	270
Delaware	1
Massachusetts	732
New Mexico	25
Vermont	86

WEEKLY REPORTS FROM CITIES

City reports for week ended March 4, 1933

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	0	1	0	1	2	0	0	0	0	18	26
New Hampshire:											
Concord	0		0	0	1	0	0	0	0	0	11
Nashua	0		0	1	0	0	0	0	0	0	
Vermont:											
Barre	0		0	0	0	0	0	1	0	7	2
Burlington	0		0	0	0	1	0	0	0	0	14
Massachusetts:											
Boston	3	2	3	54	14	85	0	11	0	85	235
Fall River	1		0	0	3	18	0	1	0	8	36
Springfield	1		0	2	1	18	0	1	0	12	37
Worcester	0		1	1	4	22	0	2	0	9	49
Rhode Island:											
Pawtucket	0		0	0	1	0	0	0	0	0	14
Providence	1	4	1	0	3	16	0	4	0	28	66
Connecticut:											
Bridgeport	0	3	1	23	1	13	0	2	0	0	31
Hartford	0	1	0	5	3	11	0	1	0	2	43
New Haven	0		2	0	3	3	0	0	0	10	44
New York:											
Buffalo	10		1	12	25	46	0	7	0	23	146
New York	40	53	18	1,725	189	313	0	95	5	105	1,591
Rochester	0		3	1	8	29	0	4	0	14	55
Syracuse	1		0	1	6	35	0	1	0	11	52
New Jersey:											
Camden	5		0	0	6	8	0	1	0	0	18
Newark	0	15	0	486	8	46	0	4	0	26	83
Trenton	1	2	1	6	4	18	0	1	0	1	36
Pennsylvania:											
Philadelphia	5	12	5	92	44	131	0	34	1	5	517
Pittsburgh	6	5	2	7	18	51	0	5	0	32	164
Reading	0		0	87	2	16	0	1	0	7	20
Ohio:											
Cincinnati	2	1	1	0	17	25	0	7	0	4	159
Cleveland	6	68	2	1	12	184	0	14	0	35	178
Columbus	0		0	63	6	3	0	0	0	0	78
Toledo	4	2	0	176	9	60	0	6	0	5	75

City reports for week ended March 4, 1933—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Indiana:											
Fort Wayne	3	-------	1	0	1	1	0	1	0	0	23
Indianapolis	4	-------	1	30	9	26	0	4	0	3	--------
South Bend	0	-------	0	0	4	7	0	0	0	7	15
Terre Haute	0	-------	0	17	2	7	0	2	0	0	25
Illinois:											
Chicago	5	5	13	223	75	244	0	35	0	14	758
Springfield	1	2	0	0	2	4	0	1	0	3	23
Michigan:											
Detroit	12	1	1	362	22	161	0	11	0	120	233
Flint	1	12	0	32	5	3	0	1	0	4	31
Grand Rapids	0	-------	1	4	3	11	0	0	0	51	25
Wisconsin:											
Kenosha	0	-------	0	0	0	0	9	0	0	19	6
Madison	0	-------	-------	76	-------	6	0	-------	0	8	--------
Milwaukee	1	-------	0	3	2	40	0	5	0	73	83
Racine	2	-------	0	1	0	9	0	0	0	12	10
Superior	0	-------	0	0	0	0	0	0	0	4	3
Minnesota:											
Duluth	0	-------	0	8	3	5	0	1	0	49	19
Minneapolis	1	-------	0	1,019	5	27	0	2	0	8	80
St. Paul	2	-------	0	342	5	15	0	0	1	51	57
Iowa:											
Des Moines	4	-------	-------	1	-------	2	0	-------	0	1	35
Sioux City	0	-------	-------	1	-------	1	0	-------	0	4	--------
Waterloo	0	-------	-------	0	-------	1	0	-------	0	1	--------
Missouri:											
Kansas City	2	-------	1	234	25	48	0	0	0	4	122
St. Joseph	0	-------	0	4	4	1	0	0	0	7	20
St. Louis	20	1	3	17	9	31	0	9	1	2	222
North Dakota:											
Fargo	0	-------	0	1	1	2	0	0	0	0	4
Grand Forks	1	-------	0	0	0	2	0	0	0	0	--------
South Dakota:											
Aberdeen	0	-------	0	1	0	5	2	0	0	0	--------
Sioux Falls	0	-------	0	3	0	0	0	0	0	0	9
Nebraska:											
Omaha	5	-------	0	7	4	16	0	1	0	0	47
Kansas:											
Topeka	0	-------	0	80	3	1	0	1	0	0	34
Wichita	1	-------	3	0	10	1	1	0	0	1	62
Delaware:											
Wilmington	1	-------	0	1	2	2	0	1	0	0	31
Maryland:											
Baltimore	3	18	5	3	25	65	0	12	0	3	210
Cumberland	0	1	0	0	0	0	0	0	0	0	7
Frederick	0	-------	0	0	0	0	0	0	0	0	5
District of Columbia:											
Washington	5	1	1	3	18	13	0	13	0	4	140
Virginia:											
Lynchburg	3	-------	0	0	1	3	0	1	0	2	11
Norfolk	0	-------	0	1	3	2	0	2	0	7	36
Richmond	1	-------	0	0	4	5	0	0	0	6	51
Roanoke	0	-------	0	213	1	6	0	0	0	0	14
West Virginia:											
Charleston	0	1	1	0	0	1	0	0	1	6	22
Wheeling	0	-------	0	26	2	3	0	0	0	10	21
North Carolina:											
Raleigh	0	-------	0	1	0	1	0	1	0	0	10
Wilmington	0	-------	0	110	1	0	0	0	0	1	11
Winston-Salem	2	4	0	0	1	2	0	0	0	0	13
South Carolina:											
Charleston	0	37	2	1	2	0	0	4	0	0	23
Columbia	0	-------	0	0	-------	0	0	-------	0	0	--------
Greenville	0	-------	0	38	0	0	0	0	0	0	--------
Georgia:											
Atlanta	9	20	1	1	11	3	0	1	2	22	75
Brunswick	0	-------	0	1	1	0	0	0	0	0	5
Savannah	0	237	1	0	3	0	0	2	0	0	27
Florida:											
Miami	1	8	0	1	1	0	0	3	0	1	21
Tampa	2	2	2	0	2	1	0	0	0	2	19

City reports for week ended March 4, 1933—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Kentucky:											
Ashland	1	1	0	5	0	1	0	0	1	0	--------
Lexington	0	3	0	2	2	0	0	1	0	0	16
Louisville	0	4	0	0	9	11	0	4	0	2	72
Tennessee:											
Memphis	0	-------	4	3	11	6	0	4	0	0	92
Nashville	0	-------	4	2	6	1	0	4	0	0	30
Alabama:											
Birmingham	3	8	2	0	5	2	0	4	0	6	57
Mobile	3	-------	2	0	1	0	0	0	0	0	17
Montgomery	1	1	--------	1	-------	0	0	------	0	1	--------
Arkansas:											
Fort Smith	0	-------	--------	0	-------	0	0	-------	0	0	--------
Little Rock	0	-------	0	1	3	0	0	3	0	0	6
Louisiana:											
New Orleans	5	3	4	1	9	10	0	4	2	3	136
Shreveport	0	-------	0	0	5	0	0	1	0	0	23
Oklahoma:											
Tulsa	1	-------	--------	1	-------	2	1	------	------	3	--------
Texas:											
Dallas	7	5	5	92	13	6	0	1	0	3	62
Fort Worth	1	-------	0	285	3	3	0	2	1	0	29
Galveston	0	-------	0	0	2	0	0	0	0	0	9
Houston	4	-------	1	49	3	0	1	2	2	0	56
San Antonio	4	-------	4	19	3	1	1	10	0	0	53
Montana:											
Billings	0	-------	0	0	0	0	0	0	0	0	7
Great Falls	0	-------	0	4	0	2	0	0	0	2	8
Helena	0	-------	0	0	0	0	0	0	0	0	5
Missoula	0	-------	0	3	0	3	0	0	0	0	1
Idaho:											
Boise	0	-------	0	21	0	0	2	1	0	0	3
Colorado:											
Denver	1	58	1	2	14	22	0	1	0	0	66
Pueblo	0	-------	0	0	1	2	0	0	0	2	10
New Mexico:											
Albuquerque	2	-------	1	0	0	1	0	3	0	2	11
Arizona:											
Phoenix	0	-------	0	11	4	7	0	7	0	0	--------
Utah:											
Salt Lake City	0	-------	0	1	3	7	0	0	1	8	27
Nevada:											
Reno	0	-------	0	0	3	0	0	0	0	0	8
Washington:											
Seattle	0	-------	--------	1	-------	11	0	-------	0	1	--------
Spokane	0	-------	--------	1	-------	0	0	-------	0	0	--------
Tacoma	0	-------	0	0	3	2	3	0	0	0	26
Oregon:											
Portland	1	1	1	4	3	6	3	2	0	1	73
Salem	0	-------	0	38	0	0	0	0	0	1	--------
California:											
Los Angeles	-------	-------	--------	-------	-------	-------	-------	-------	-------	-------	--------
Sacramento	0	3	1	0	5	0	0	1	1	1	27
San Francisco	2	26	1	4	19	3	0	7	0	55	166

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City reports for week ended March 4, 1933—Continued

State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths	
Massachusetts:			
Boston	1	1	0
Connecticut:			
Bridgeport	1	0	0
New Jersey:			
Trenton	1	0	0
Pennsylvania:			
Philadelphia	4	2	0
Pittsburgh	2	1	0
Indiana:			
Indianapolis	3	1	1
Illinois:			
Chicago	19	13	0
Michigan:			
Detroit	1	0	0
Flint	0	1	0
Grand Rapids	1	1	0
Minnesota:			
Duluth	1	0	0
St. Paul	1	0	0
Iowa:			
Sioux City	2	0	0
Missouri:			
Kansas City	3	3	0
St. Joseph	2	0	0
St. Louis	1	1	0
North Carolina:			
Winston-Salem	1	0	0
Georgia:			
Atlanta	3	1	0
Tennessee:			
Memphis	2	1	1
Louisiana:			
New Orleans	1	0	0
Texas:			
Fort Worth	1	0	0
California:			
San Francisco	1	0	0

Lethargic encephalitis.—Cases: Atlanta, 1.

Pellagra.—Cases: Winston-Salem, 2; Charleston, S. C., 2; Miami, 1; Memphis, 1; Birmingham, 1; New Orleans, 2.

Typhus fever.—Cases: Savannah, 1.

FOREIGN AND INSULAR

INFLUENZA IN EUROPE AND THE BRITISH ISLES

England and Wales.—For the week ended February 25, 1933, 344 deaths from influenza were registered in the great towns of England and Wales, as compared with 630 deaths for the preceding week. The general death rate in these towns for the week ended February 25 was 14.2 per 1,000 population. For the preceding week the general death rate was 15.9 per 1,000.

Northern Ireland.—Reports for the week ended February 25, 1933, indicated continued decrease in the incidence of influenza in Northern Ireland.

Europe.—Reports of the prevalence of influenza in a number of European countries indicated generally a decrease in the incidence of influenza during the latter part of February.

CANADA

Provinces—Communicable diseases—Two weeks ended February 25, 1933.—The Department of Pensions and National Health of Canada reports cases of certain communicable diseases for the two weeks ended February 25, 1933, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		1	1							2
Chicken pox		10	1	354	745	118	36	4	110	1,378
Diphtheria	1	1	8	39	19	9	18	4		94
Dysentery									1	1
Erysipelas				11	1	8		1	3	24
Influenza		75		6	73	3			60	217
Measles		35	17	311	526	3	3	19	23	937
Mumps		2			558	68	4		12	644
Paratyphoid fever					6					6
Pneumonia		4			10				4	18
Poliomyelitis				5					1	6
Scarlet fever		10	10	191	148	43	29	7	17	455
Smallpox							9			9
Trachoma					1				41	42
Tuberculosis			5	159	78	36	35	9	51	373
Typhoid fever		2	3	20	13	11	1	3	1	54
Undulant fever					3					3
Whooping cough		2		294	211	59	46	8	35	655

DENMARK

Communicable diseases—October–December, 1932.—During the months of October, November, and December, 1932, cases of certain communicable diseases were reported in Denmark as follows:

Disease	Cases			Disease	Cases		
	Oct.	Nov.	Dec.		Oct.	Nov.	Dec.
Cerebrospinal meningitis	11	7	6	Poliomyelitis	7	9	1
Chicken pox	1	43	42	Puerperal fever	7	18	16
Diphtheria and croup	354	395	379	Scabies	858	1,127	829
Erysipelas	307	342	245	Scarlet fever	252	339	210
German measles		2	3	Syphilis	67	78	59
Gonorrhea	930	888	685	Tetanus	6	7	3
Influenza	4,968	4,759	4,231	Typhoid fever	5	3	5
Lethargic encephalitis	10	3	1	Undulant fever (Bac. abort. Bang)	34	40	37
Measles	836	1,032	745	Whooping cough	1,404	1,550	1,243
Mumps	110	200	220				
Paratyphoid fever	111	58	8				

MEXICO

Tampico—Communicable diseases—February, 1933.—During the month of February, 1933, certain communicable diseases were reported in Tampico, Mexico, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	2		Scarlet fever	1	
Enteritis (various)	24	26	Smallpox	1	
Influenza	25	2	Tuberculosis		25
Leprosy	2		Typhoid fever	2	
Malaria	116	7	Whooping cough	1	

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

(NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for February 24, 1933, pp 200–210. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued March 31, 1933, and thereafter, at least for the time being, in the issue published on the last Friday of each month.)

Cholera

Philippine Islands.—For the week ended March 11, 1933, 2 cases of cholera with 2 deaths were reported in the Province of Cebu, Philippine Islands, and 23 cases with 21 deaths in the Province of Leyte.

Plague

Argentina.—Plague has been reported in Argentina as follows: January 10–25, 1933, 10 cases and 7 deaths in Tumbaya, Jujuy Province; January 25, 1933, 1 case and 1 death at Laguna Larga, Cordoba Province.

UNITED STATES TREASURY DEPARTMENT

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UNITED STATES PUBLIC HEALTH SERVICE

HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst Surg Gen R C. WILLIAMS, *Chief of Division*

The PUBLIC HEALTH REPORTS are issued weekly by the United States Public Health Service through its Division of Sanitary Reports and Statistics, pursuant to acts of Congress approved February 15, 1893, and August 14, 1912.

They contain: (1) Current information of the prevalence and geographic distribution of preventable diseases in the United States in so far as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other communicable diseases throughout the world. (2) Articles relating to the cause, prevention, or control of disease. (3) Other pertinent information regarding sanitation and the conservation of the public health.

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PUBLIC HEALTH REPORTS

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PRODUCTION OF A MALIGNANT GROWTH IN A GUINEA PIG*

By T. J. Glover, M. B., and J. L. Engle, M. D.

The purpose of this report is to place on record the production of metastatic malignancy in one of a group of guinea pigs inoculated with a culture containing a spore-bearing microorganism which was isolated, on special medium, from the tissue of a microscopically proved carcinoma of a human breast. The microorganism was again recovered from the malignant tissue of the animal herein reported.

A detailed report will be made at a later date, giving the findings on the remainder of this group of guinea pigs, as well as on a series of other experimental animals inoculated with the same microorganism.

The inoculation of the culture was made in the mammary region of an adult female guinea pig (a discarded breeder) on November 5, 1932. The animal was observed at frequent intervals until sacrificed.

On November 8, a rather evenly distributed infiltration was noted in the region of inoculation. This slowly became localized into a well-defined indurated mass about 2.3 cm in width and 3.4 cm in length. It was noted on December 22 that isolated nodular areas were developing in the region.

On January 9, 1933, the nodules were noted as enlarging and the inguinal glands were distinctly palpable about two weeks later.

On February 20, 1933, the nodular areas in the breast region and the glands in the inguinal region had increased in size. On February 24 weakness of the animal was noted, other conditions remaining substantially the same.

On February 28, the animal was very weak and was chloroformed. The gross postmortem findings were as follows:

Breast area (primary site).—Lobulated, nodular tumor masses in breast region covering an area 3.4 cm in length by 2.5 cm in width and showing invasion of anterior and posterior inguinal fatty structures and involving the musculature of the anterior abdominal wall. The depth of the tumor mass measured approximately 2.5 cm. Section of the primary tumor disclosed a pearly gray, fleshy, myxomatous, diffusely infiltrating tumor mass.

* From the National Institute of Health, Washington, D. C.

Inguinal area.—Enlarged bulging glands 1.6 cm by 8 mm in diameter, of same gross appearance as primary masses.

Large and small bowel.—Grossly negative.

Stomach.—Grossly negative.

Omentum presents scattered, diffuse, and nodular areas of tissue having the same appearance as the primary growth and varying in size from 1 mm to 8 mm in diameter.

Kidneys.—Both kidneys appear essentially normal, except that in one a minute, elongated, grayish focus is seen in a pyramid.

An enlarged gland at the renal level to the right of the spinal column presents the same gross appearance as the primary and omental masses. It is 3 mm in diameter.

Lungs.—Present scattered areas of pneumonic consolidation.

Chest wall.—Two enlarged retrosternal glands, 1.4 cm by 5 mm in diameter, presenting same gross appearance on section as primary and metastatic masses.

The following report on the microscopic findings in this guinea pig was submitted by Surg. R. D. Lillie, of the United States Public Health Service, in charge of the work in pathology at the National Institute of Health:

(NIH 3161—Guinea pig 117 x 17)

Inguinal mass, primary.—The tumor is composed of lobules and alveoli of large polygonal cells with highly vacuolated, foamy, hydropic, faintly metachromatic cytoplasm and small leptochromatic or oxyphil karyolytic nuclei, the cells frequently disintegrating to form clear spaces containing faintly oxyphilic, markedly metachromatic rings about the size and shape of the nuclei in better preserved cells. The lobules rest in a delicate collagenous reticulum which does not extend into them. Scattered, atrophic, striated muscle fibers are included in parts of the mass, and there is some marginal invasion of the underlying muscle. Some fibrous trabeculae run through the mass and contain ducts lined by cuboidal, stratified cuboidal, and stratified squamous epithelia, often containing pus and surrounded by a variable amount of lymphocyte infiltration.

Lateral inguinal mass, contiguous with primary.—Similar in structure to the primary, except that no ducts are included. No lymphadenoid tissue is identified in this block.

Omentum.—Similar in structure to the primary tumor, but shows less nuclear degeneration and contains no ducts.

Stomach (antrum).—No lesions.

Esophagus.—Normal.

Liver.—Slight, irregular periportal fibrosis in left lobe, slight periportal lymphocyte infiltration in both lobes.

Kidneys.—There are occasional small, sometimes intraglomerular, nodules of tumor tissue, similar to that found in the primary growth.

Subdiaphragmatic preaortic lymph node.—Partially replaced and infiltrated by masses of lobules and acini of large, foamy, disintegrating polygonal cells, with karyolyzing nuclei, lying in a delicate collagenous reticulum.

Anterior mediastinal mass.—Confused mass of acinous glandular tissue as in the inguinal tumor, scar tissue, lymphadenoid tissue, recent and encapsulating abscesses and foci of plasma and lymphoid cell infiltration.

Retrosternal lymph nodes.—Largely replaced by masses of large acini lined by disintegrating large polygonal foamy cells with karyolytic nuclei.

Trachea.—Slight lymphocyte infiltration of mucosa and pus in lumen.

Peritracheal lymph gland.—Oedema, an abscess filled with a loose fibrinopurulent exudate and partially walled off by an incomplete zone of epithelioid cells, and reticuloendothelial proliferation in part of the marginal sinus. The oedematous mediastinal fat contains occasional clumps of large cells of epithelial type, lying apparently in lymphatic spaces.

Lung (*right lower*).—Nodular consolidation characterized by purulent bronchial and alveolar exudation, sometimes associated with septal swelling and proliferation, patches of serous alveolar exudation, moderate focal perivascular lymphocyte infiltration. Single, small, apparently intraalveolar nodule in unconsolidated area composed of loosely packed vacuolated stellate cells with broad cytoplasm containing a few carbon granules and leptochromatic vesicular nuclei with minute nucleoli. On three sides the nodule is surrounded by a thin collagenous lamella which does not penetrate the nodule, the fourth side abuts on a free space. The other lobe sectioned (*left upper*) shows a similar though less extensive purulent bronchitis and bronchopneumonia, focal atelectasis and septal thickening and focal perivascular lymphocyte infiltration.

COMMENT

The new growth has apparently arisen in breast tissue, resembles lactating mammary acini in histologic structure, and is identical in structure in the primary and in the various metastatic masses. In the invasion and destruction of muscular tissue and in the production of distant metastases it fulfills two of the criteria of malignancy. Differentiation appears to be of high grade; anaplasia, conversely, slight.

Diagnosis.—Malignant adenoma with metastases in lymph nodes, omentum, and kidneys.

SICKNESS AMONG MALE INDUSTRIAL EMPLOYEES DURING THE FINAL QUARTER OF 1932[1]

By Dean K. Brundage, *Statistician, Office of Industrial Hygiene and Sanitation, United States Public Health Service*

The influenza epidemic during the fourth quarter of 1932 caused a higher rate of sickness which disabled for eight consecutive calendar days or longer than was recorded for the like period of each of the three preceding years among a sample group of male industrial employees. The industrial establishments included are identical for 1932 and 1931, and for 1929 and 1930 a large majority of the establishments under consideration was the same. If the amount of the excess sickness frequency from influenza or grippe is deducted from the rate of total sickness, one finds that the frequency of sickness exclusive of influenza was just about the same as in the corresponding quarter of 1930 or 1931. Pneumonia as well as influenza increased in frequency in the fourth quarter of 1932, but the pneumonia rate was still below that recorded for the like quarter of 1929.

The frequency of diseases of the digestive system as a whole was practically the same as in the fourth quarter of 1931. The rate for diseases of the skin continued to be favorable. An increase in the frequency of diseases of the heart and arteries and genito-urinary diseases mentioned in the report for the third quarter of 1932 occurred also in the fourth quarter. Whether the indicated increase is real or due merely to a larger proportion of older employees on the pay roll at the present time, it is impossible to say.

These sickness data apply in the main to employed men, although many of them work only on a part-time basis. Only a small proportion are unemployed, as membership usually ceases soon after employment is terminated. The reporting establishments are scattered all over the United States, although a preponderance of them lies east of the Mississippi and north of the Ohio Rivers.

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[1] The report for the third quarter was published in the Public Health Reports for Dec. 16, 1932.

TABLE 1.—*Frequency of disability lasting eight calendar days or longer in the fourth quarter of 1932 compared with the same quarter of 1931, 1930, and 1929. (Male morbidity experience of 32 industrial companies which reported their cases to the United States Public Health Service during all four years)* [1]

Diseases and disease groups which caused disability. (Numbers in parentheses are disease title numbers from the International List of the Causes of Death, Fourth Revision, Paris, 1929)	Annual number of disabilities per 1,000 men in fourth quarter of—			
	1932	1931	1930	1929
Sickness and nonindustrial injuries [2]	106.0	84.3	87.2	96.6
Nonindustrial injuries	13.6	13.5	13.0	13.1
Sickness [2]	92.4	70.8	74.2	83.5
Respiratory diseases	46.1	25.2	27.6	37.1
Influenza and grippe (11)	30.5	10.7	11.6	15.1
Bronchitis—acute and chronic (106)	3.5	3.5	4.2	6.2
Pneumonia—all forms (107–109)	2.8	1.7	2.5	3.1
Diseases of the pharynx and tonsils (115a)	3.8	4.5	4.3	6.8
Tuberculosis of the respiratory system (23)	.7	.8	.8	1.1
Other respiratory diseases (104, 105, 110–114)	4.8	4.0	4.2	4.8
Nonrespiratory diseases	46.3	45.6	46.6	46.4
Diseases of the stomach, cancer excepted (117, 118)	3.5	3.8	3.9	3.7
Diarrhea and enteritis (120)	1.1	1.2	1.5	1.4
Appendicitis (121)	3.4	3.6	3.4	3.8
Hernia (122a)	1.7	1.5	2.1	1.3
Other digestive diseases (115b, 116, 122b–129)	3.4	2.9	2.9	2.5
Rheumatic group, total	10.6	9.9	10.4	12.1
Rheumatism—acute and chronic (56–58)	4.7	4.4	4.9	5.0
Diseases of the organs of locomotion (156b)	3.5	3.4	3.3	4.0
Neuralgia, neuritis, sciatica (87a)	2.4	2.1	2.2	3.1
Neurasthenia and the like (part of 87b)	1.1	1.4	1.2	1.1
Other diseases of the nervous system (78–85, part of 87b)	.8	1.2	1.0	1.1
Diseases of the heart and arteries and nephritis (90–99, 102, 130–132)	3.8	3.5	3.5	3.7
Other genito-urinary diseases (133–138)	2.4	2.4	2.3	2.1
Diseases of the skin (151–153)	2.6	3.1	3.7	3.5
Epidemic and endemic diseases except influenza (1–10, 12–18, 33, 37, 38, part of 39 and 44)	1.5	1.7	1.6	1.8
Ill-defined and unknown causes (200)	3.2	2.0	1.6	1.7
All other diseases (19–22, 24–32, 36, part of 39 and 44, 40–43, 45–55, 59–77, 88, 89, 100, 101, 103, 154–156a, 157, 162)	7.2	7.4	7.5	6.6
Average number of males covered in the record	127,185	158,090	154,165	160,023
Number of companies included	32	32	27	23

[1] Except that the rates for 1930 and 1929 cover 27 and 23 companies, respectively, instead of 32, as in 1931 and 1932. The rates presented here for the corresponding period of preceding years differ somewhat from those shown in earlier publications because data for additional groups have become available in the meantime.

[2] Exclusive of disability from venereal diseases.

COURT DECISIONS RELATING TO PUBLIC HEALTH

Typhoid fever held not compensable under workmen's compensation act.—(Kentucky Court of Appeals; Mills *v.* Columbia Gas Construction Co., 55 S. W. (2d) 394; decided Dec. 13, 1932.) An action to recover damages was brought by one who alleged that he had contracted typhoid fever while in the employ of the defendant company as a result of drinking impure water furnished him by the defendant. The defense was that the matter came under the workmen's compensation act. The trial court, taking this view, held that it was without jurisdiction of the subject matter of the action and dismissed the plaintiff's petition. On appeal the court of appeals stated that the case turned on whether the alleged injury was compensable under the compensation act.

Under such act compensation was provided for "personal injuries sustained by the employee by accident arising out of and in the course

of his employment, or for death resulting from such accidental injury," but the act also contained a provision that "personal injury by accident, as herein defined, shall not include diseases except where the disease is a natural and direct result of a traumatic injury by accident." In holding that the typhoid fever was not a compensable injury, the court differentiated the instant case from a prior decision in which it had held that tularaemia, contracted by a person while dressing rabbits in the course of his employment, was compensable. Speaking with regard to such tularaemia case, the court said that there the germs had "entered into the body through an abrasion or break in its integumentum," but that in the present case "the germs were absorbed into the system through the normal channels of entry." The court reversed the judgment of the lower court, saying:

> We are clear, then, that typhoid fever resulting from the absorption of typhoid bacilli into the system through the normal channels of entry is, without more, certainly not a disease resulting naturally or directly, or indeed at all, from a traumatic injury, and, such being the case, is not a compensable injury within the meaning of our compensation act. It follows that the lower court incorrectly overruled the demurrer to the answer pleading lack of jurisdiction. Such demurrer should have been sustained. No other questions are herein decided.

Compensability of pneumonia under workmen's compensation act.—(Kansas City, Mo., Court of Appeals; Rinehart *v.* F. M. Stamper Co., 55 S. W. (2d) 729; decided Dec. 12, 1932.) In an action for damages based on negligence, the plaintiff alleged that, while employed by the defendant company, he was ordered to work in a refrigerating plant which was maintained by the company. At that particular time, he alleged that he was perspiring freely and that, as a result of his work in the refrigerating plant, his clothing was frozen upon his body and he contracted pneumonia. The trial court, agreeing with the company's contention, held that the petition showed exclusive jurisdiction in the workmen's compensation commission and dismissed it. An appeal to the court of appeals followed.

The compensation law defined "accident" as "an unexpected or unforeseen event happening suddenly and violently, with or without human fault, and producing at the time objective symptoms of an injury." It also defined "injury" and "personal injuries" as meaning "only violence to the physical structure of the body and such disease or infection as naturally results therefrom." The act provided, too, that "The said terms shall in no case be construed to include occupational disease in any form, nor shall they be construed to include any contagious or infectious disease contracted during the course of the employment."

The appellate court affirmed the judgment of the trial court, holding that the plaintiff had alleged facts upon which the workmen's compensation commission could legally find all the elements of a compensable case under the compensation law.

Damage action for lead poisoning.—(Washington Supreme Court; Hatcher *v.* Globe Union Mfg. Co., 16 P. (2d) 824; decided Dec. 14, 1932.) An action to recover damages for lead poisoning was brought by a person who had been employed by the defendant company in its storage battery factory. Judgment went against the company in the trial court and an appeal was taken to the supreme court. Following are certain of the points decided by the appellate court:

Adhering to former decisions, the plaintiff's remedy was held to be an action at law and not a proceeding under the workmen's compensation act.

The admission by the trial court of evidence showing alterations to certain machinery after the plaintiff had become sick and had left the defendant's employ constituted reversible error.

An instruction that the defense of assumption of risk was not available to an employer who failed to comply with the factory act with respect to the place in which he required his employees to work stated the law correctly.

Certain requested instructions which would have advised the jury that the duty imposed by law upon the employer was merely to use reasonable and ordinary care to furnish a safe place to work did not state the law correctly where the action was brought under the factory act and the evidence brought it within its provisions.

Whether the assumption of risk could have been successfully invoked as a defense was dependent primarily upon whether the appellant had made a bona fide effort to comply with the factory act.

What was said with regard to the above-mentioned requested instructions applied with equal force to certain other requested instructions which would have advised the jury that one seeking to recover damages for injuries sustained must use his own faculties and the means afforded him for his own protection and that a failure so to do barred recovery on his part.

DEATHS DURING WEEK ENDED MARCH 11, 1933

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Mar 11, 1933	Corresponding week, 1932
Data from 85 large cities of the United States		
Total deaths	8,505	9,410
Deaths per 1,000 population, annual basis	11 9	13.4
Deaths under 1 year of age	594	657
Deaths under 1 year of age per 1,000 estimated live births [1]	51	54
Deaths per 1,000 population, annual basis, first 10 weeks of year	12 4	12 4
Data from industrial insurance companies		
Policies in force	68,890,681	73,837,809
Number of death claims	14,326	15,338
Death claims per 1,000 policies in force, annual rate	10.8	10.9
Deaths claims per 1,000 policies, first 10 weeks of year, annual rate	11.3	10.1

[1] 1933, 81 cities, 1932, 78 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended March 18, 1933, and March 19, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended March 18, 1933, and March 19, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Mar. 18, 1933	Week ended Mar. 19, 1932	Week ended Mar. 18, 1933	Week ended Mar. 19, 1932	Week ended Mar. 18, 1933	Week ended Mar. 19, 1932	Week ended Mar. 18, 1933	Week ended Mar. 19, 1932
New England States:								
Maine		3	1	32	3	307	1	1
New Hampshire		2	4			6	0	0
Vermont	1	3			4	73	0	0
Massachusetts	16	42	6	9	341	479	0	3
Rhode Island	3	5	2		3	355	0	0
Connecticut	4	8	12	70	159	200	1	0
Middle Atlantic States:								
New York	49	110	[1] 21	[1] 244	4,041	2,251	1	13
New Jersey	40	22	22	205	1,536	224	1	1
Pennsylvania	70	104			1,056	2,029	5	3
East North Central States:								
Ohio	30	38	216	198	597	516	1	0
Indiana	26	39	65	294	152	65	8	10
Illinois [2]	28	88	104	426	399	346	23	4
Michigan	33	43	6	110	1,353	942	2	6
Wisconsin	3	10	90	773	494	574	2	2
West North Central States:								
Minnesota	3	10	3	2	1,322	12	0	2
Iowa	9	9			9	4	5	0
Missouri	23	39	18	26	275	56	15	0
North Dakota	2	3			70	95	1	0
South Dakota	12	5		16	4	25	0	2
Nebraska	12	9	15	22	6	3	0	1
Kansas	7	27		3	334	240	2	1
South Atlantic States:								
Delaware	11				5	1	0	0
Maryland [3]	7	20	36	263	3	53	1	0
District of Columbia	4	11	3	2	3	3	0	0
Virginia	13				473		3	1
West Virginia	10	14	31	378	143	626	0	0
North Carolina	15	15	69	52	508	571	0	3
South Carolina [2]	4	8	708	1,477	217	84	0	0
Georgia [2]	9	7	184	266	40	88	1	1
Florida	7	14	13	5	40	4	2	0
East South Central States:								
Kentucky	11	23	51	1,015	80	96	0	6
Tennessee	3	11	100	2,675	30	149	3	2
Alabama [2]	15	9	120	66	25	1	1	1
Mississippi	7	12					0	1
West South Central States:								
Arkansas	6	8	61	282	112		2	1
Louisiana	12	23	7	22	56	56	5	3
Oklahoma [4]	15	15	104	835	34	12	1	1
Texas [2]	63	30	117	460	750	27	3	1
Mountain States:								
Montana	3		10	105	31	95	1	0
Idaho	1		1	2	24	2	0	0
Wyoming	1				8	5	0	0
Colorado	7	12	43		9	82	2	1
New Mexico	7	18		690	16	53	1	0
Arizona	1	2	2	27	15	2	0	0
Utah [3]	2	1			2	1	1	0
Pacific States:								
Washington	1				51	623	0	1
Oregon	1	8	30	201	81	173	0	1
California	53	92	61	138	1,146	524	1	3
Total	660	972	2,336	11,421	16,058	12,133	96	76

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended March 18, 1933, and March 19, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Mar. 18, 1933	Week ended Mar. 19, 1932	Week ended Mar. 18, 1933	Week ended Mar. 19, 1932	Week ended Mar. 18, 1933	Week ended Mar. 19, 1932	Week ended Mar. 18, 1933	Week ended Mar. 19, 1932
New England States:								
Maine	0	0	13	29	0	0	1	0
New Hampshire	0	0	26	41	0	0	0	0
Vermont	0	0	13	8	0	4	0	0
Massachusetts	0	0	417	504	0	0	3	3
Rhode Island	0	0	46	50	0	0	0	1
Connecticut	0	0	176	125	3	0	0	0
Middle Atlantic States:								
New York	1	2	1,120	1,741	0	6	8	4
New Jersey	0	0	364	288	0	0	1	2
Pennsylvania	0	0	1,071	1,050	0	0	6	13
East North Central States:								
Ohio	1	1	1,095	349	16	38	4	9
Indiana	0	0	128	166	1	11	2	6
Illinois [2]	1	0	546	443	15	23	0	6
Michigan	1	1	608	446	1	13	2	14
Wisconsin	0	0	119	69	4	0	1	2
West North Central States:								
Minnesota	0	0	76	121	0	4	1	2
Iowa	0	0	35	64	36	39	0	2
Missouri	0	0	86	59	6	8	1	1
North Dakota	0	0	10	10	2	4	0	0
South Dakota	1	0	9	11	0	14	2	1
Nebraska	0	0	39	32	1	8	0	0
Kansas	0	0	57	48	0	4	3	0
South Atlantic States:								
Delaware	0	0	10	16	0	0	0	0
Maryland [3]	0	0	111	136	0	0	2	4
District of Columbia	0	0	28	29	0	0	1	0
Virginia	0	1	40	--------	0	--------	10	--------
West Virginia	1	0	27	38	0	0	6	10
North Carolina	1	1	49	62	5	3	6	3
South Carolina [2]	2	0	4	6	0	0	4	4
Georgia [2]	0	0	12	10	10	1	1	12
Florida	1	0	5	5	0	0	5	5
East South Central States:								
Kentucky	0	0	54	117	1	4	3	16
Tennessee	0	1	38	29	2	19	5	7
Alabama [2]	0	0	15	22	1	17	5	7
Mississippi	0	1	6	11	0	31	3	6
West South Central States:								
Arkansas	0	0	7	11	8	22	0	1
Louisiana	0	0	19	21	2	3	17	14
Oklahoma [4]	0	0	33	22	8	8	2	0
Texas [2]	2	0	39	43	36	72	7	4
Mountain States:								
Montana	0	1	7	38	0	2	5	0
Idaho	0	0	6	9	10	4	2	0
Wyoming	0	0	11	12	0	0	4	3
Colorado	0	0	34	37	0	0	2	0
New Mexico	0	0	16	11	0	0	1	1
Arizona	0	0	16	8	1	0	0	0
Utah [3]	0	0	10	7	0	0	1	1
Pacific States:								
Washington	0	0	37	29	3	13	1	1
Oregon	0	0	16	23	2	11	0	0
California	1	3	178	162	24	8	7	4
Total	13	12	6,882	6,571	198	394	135	169

[1] New York City only.
[2] Typhus fever, week ended March 18, 1933, 12 cases: 1 case in Illinois, 1 case in South Carolina, 2 cases in Georgia, 7 cases in Alabama, and 1 case in Texas.
[3] Week ended Friday.
[4] Figures for 1933 are exclusive of Oklahoma City and Tulsa, and for 1932 are exclusive of Tulsa only.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
February, 1933										
Arizona	4	15	100	1	39		0	64	0	5
Arkansas	2	30	631	42	148	50	1	50	32	13
Indiana	7	160	411		73		3	554	7	13
Maine	3	9	1,356		9		0	127	0	7
Michigan	7	94	93	1	3,148		4	2,217	5	16
New Jersey	10	78	438		3,559		1	1,301	0	10
New York	19	241			9,310		3	3,274	0	22
North Dakota		12	515		465		1	67	4	0
Pennsylvania	23	323			3,765		0	3,530	0	20
Tennessee	6	39	727	15	187	8	2	124	4	19
Wyoming	1		4		44		0	21	0	0

February, 1933

	Cases
Chicken pox:	
Arizona	109
Arkansas	95
Indiana	593
Maine	141
Michigan	2,112
New Jersey	1,516
New York	3,397
North Dakota	56
Pennsylvania	3,981
Tennessee	210
Wyoming	36
Conjunctivitis:	
Wyoming	19
Dysentery:	
Michigan	5
New York	5
Tennessee	4
German measles:	
Arizona	3
Arkansas	32
Indiana	1
Maine	13
Michigan	1,035
New Jersey	78
New York	116
Pennsylvania	33
Tennessee	58
Impetigo contagiosa:	
Tennessee	5
Lead poisoning:	
New Jersey	1
Lethargic encephalitis:	
Michigan	5
New Jersey	2
New York	5
Pennsylvania	2
Tennessee	3
Mumps:	
Arizona	79
Arkansas	36

Mumps—Continued.	Cases
Indiana	206
Maine	80
Michigan	1,239
New Jersey	815
Pennsylvania	1,941
Tennessee	137
Wyoming	2
Ophthalmia neonatorum:	
Arkansas	2
New Jersey	2
New York	4
Pennsylvania	3
Tennessee	5
Paratyphoid fever:	
New York	8
Tennessee	1
Puerperal septicemia:	
Pennsylvania	16
Rabies in animals:	
New Jersey	25
New York [1]	1
Septic sore throat:	
Indiana	5
Maine	3
Michigan	37
New York	20
Tennessee	8
Wyoming	1
Tetanus:	
New Jersey	1
New York	2
Pennsylvania	3
Tennessee	2
Trachoma:	
Arizona	59
Arkansas	6
Indiana	1
New Jersey	20

Trachoma—Continued.	Cases
North Dakota	4
Pennsylvania	3
Tennessee	32
Trichinosis.	
New Jersey	3
New York	8
Pennsylvania	4
Tularaemia.	
Arkansas	1
North Dakota	1
Pennsylvania	2
Tennessee	2
Undulant fever:	
Arizona	1
Indiana	4
Maine	1
Michigan	6
New Jersey	7
New York	20
North Dakota	1
Pennsylvania	3
Wyoming	1
Vincent's angina:	
Maine	8
New York [1]	105
Tennessee	5
Vincent's infection:	
North Dakota	8
Whooping cough:	
Arizona	18
Arkansas	43
Indiana	136
Maine	70
Michigan	1,190
New Jersey	460
New York	1,919
Pennsylvania	991
Tennessee	94
Wyoming	22

[1] Exclusive of New York City.

WEEKLY REPORTS FROM CITIES

City reports for week ended March 11, 1933

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Maine:											
Portland	0	--	0	0	1	4	0	0	0	9	24
New Hampshire:											
Concord	0	----	0	0	0	1	0	2	0	0	8
Manchester	0	----	1	0	0	4	0	0	0	0	22
Nashua	0	----	0	3	0	0	0	0	0	0	-------
Vermont:											
Barre	0	----	0	0	1	0	0	3	0	0	8
Burlington	0	----	0	0	0	6	0	0	0	0	6
Massachusetts:											
Boston	14	-------	1	51	20	97	0	13	0	61	240
Fall River	2	-------	0	0	4	10	0	3	0	10	41
Springfield	0	-------	0	1	2	12	0	1	0	32	47
Worcester	1	-------	1	13	6	32	0	2	0	6	57
Rhode Island:											
Pawtucket	0	-------	0	0	1	0	0	0	0	0	16
Providence	2	2	1	0	7	16	0	3	0	33	76
Connecticut:											
Bridgeport	0	1	0	12	2	13	0	1	1	0	25
Hartford	1	1	0	7	2	4	0	0	0	5	34
New Haven	0	-------	0	2	4	1	0	2	0	7	53
New York:											
Buffalo	4	-------	1	19	0	53	0	10	0	28	158
New York	45	30	14	1,867	192	358	0	87	7	128	1,612
Rochester	1	-------	0	1	3	34	0	1	0	10	68
Syracuse	0	-------	0	0	3	33	0	2	0	46	43
New Jersey:											
Camden	1	1	0	1	1	12	0	1	0	0	24
Newark	0	5	0	389	6	39	0	11	0	43	96
Trenton	0	2	0	7	4	21	0	4	0	3	39
Pennsylvania:											
Philadelphia	3	6	5	82	51	156	0	32	2	4	474
Pittsburgh	5	4	2	2	20	56	0	10	0	22	160
Reading	0	-------	1	73	1	15	0	1	0	1	29
Scranton	0	-------	-------	0	-------	18	0	-------	0	0	-------
Ohio:											
Cincinnati	1	-------	9	5	11	41	0	3	0	1	139
Cleveland	5	117	2	2	16	210	0	8	1	20	213
Columbus	1	-------	0	107	4	13	0	7	0	0	85
Toledo	4	-------	0	177	6	89	0	2	0	1	81
Indiana:											
Fort Wayne	0	-------	0	0	0	8	0	0	0	0	18
Indianapolis	6	-------	1	61	15	19	0	6	0	10	-------
South Bend	0	-------	0	0	0	10	0	0	0	17	17
Terre Haute	0	-------	0	0	3	11	0	1	0	0	21
Illinois:											
Chicago	4	11	6	236	67	269	0	45	0	16	656
Springfield	0	-------	0	0	2	8	0	0	0	0	26
Michigan:											
Detroit	16	1	0	513	24	187	0	22	0	95	259
Flint	2	8	0	82	3	5	0	1	0	4	20
Grand Rapids	0	-------	0	3	3	12	0	1	0	36	37
Wisconsin:											
Kenosha	0	-------	0	0	0	1	2	0	0	4	8
Madison	0	-------	1	85	0	5	0	1	0	0	8
Milwaukee	3	2	2	0	9	49	0	4	0	65	89
Racine	3	-------	0	0	0	8	0	1	0	11	8
Superior	0	-------	0	0	0	0	0	0	0	11	5
Minnesota:											
Duluth	0	-------	0	7	2	0	0	3	0	31	29
Minneapolis	1	-------	0	690	5	29	0	3	0	15	106
St. Paul	1	-------	0	319	2	21	0	4	0	46	60
Iowa:											
Des Moines	2	-------	-------	0	0	4	0	-------	0	0	33
Sioux City	2	-------	-------	2	-------	2	0	-------	0	6	-------
Waterloo	1	-------	-------	0	-------	0	1	-------	0	1	-------
Missouri:											
Kansas City	0	-------	0	197	18	40	0	5	1	3	122
St. Joseph	2	-------	0	6	8	1	0	0	0	7	30
St. Louis	19	2	-------	12	13	16	0	8	0	0	205
North Dakota:											
Fargo	0	-------	0	0	1	6	0	0	0	0	5
Grand Forks	0	-------	0	0	0	0	0	0	0	0	-------
South Dakota:											
Aberdeen	0	-------	0	0	0	1	0	0	0	0	-------

City reports for week ended March 11, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Nebraska:											
Omaha	2		0	9	5	5	0	1	0	1	42
Kansas:											
Topeka	0		0	68	3	2	0	0	0	3	14
Wichita	0		1	1	2	3	0	0	0	3	39
Delaware:											
Wilmington	0		0	2	1	6	0	1	0	0	26
Maryland:											
Baltimore	0	6	4	5	27	70	0	11	0	19	212
Cumberland	0		0	0	2	2	0	0	0	0	5
Frederick	0		0	0	0	1	0	0	0	0	3
District of Col.:											
Washington	2	3	2	5	17	21	0	15	0	2	145
Virginia:											
Lynchburg	1		0	1	2	4	0	0	1	1	9
Richmond	0		1	0	3	11	0	1	0	0	40
Roanoke	1		0	221	2	1	0	2	1	0	21
West Virginia:											
Charleston	0	1	0	1	0	3	0	0	0	3	11
Huntington	0			11		0	0		0	0	
Wheeling	0		0	27	0	0	0	0	0	1	12
North Carolina:											
Raleigh	0		0	2	1	2	0	2	0	2	20
Wilmington	0		0	56	0	0	0	0	0	0	5
Winston-Salem	1		0	0	1	6	0	2	0	5	14
South Carolina:											
Charleston	0	26	2	0	0	1	0	1	0	0	25
Columbia	0		2	0	2	0	0	0	0	0	21
Georgia:											
Atlanta	5	37	1	7	10	3	0	4	0	18	92
Brunswick	0		0	0	0	0	0	0	0	0	3
Savannah	0	120	4	0	4	0	0	1	0	0	44
Florida:											
Miami	1	2	3	0	1	0	0	4	0	0	37
Tampa	1	2	2	0	0	1	0	0	0	1	17
Kentucky:											
Ashland	0	5	0	7	0	1	0	0	0	0	
Lexington	0	5	0	1	2	2	0	1	0	0	14
Tennessee:											
Memphis	1		1	10	9	4	0	7	0	8	80
Nashville	0		0	0	6	1	0	0	0	0	38
Alabama:											
Birmingham	2	19	1	2	5	2	0	3	0	2	54
Mobile	1		0	0	2	0	0	0	0	0	18
Montgomery	2	1		0		0	0		0	2	
Arkansas:											
Fort Smith	0			1		0	0		0	0	
Little Rock	0	2	1	1	4	2	0	1	0	0	6
Louisiana:											
New Orleans	13	8	8	4	8	11	0	26	2	4	102
Shreveport	0		0	0	7	0	0	4	0	0	34
Oklahoma:											
Tulsa	3		0	7	0	1	1	0	0	1	2
Texas:											
Dallas	9	2	2		8	6	0	1	0	0	55
Fort Worth	1		2	128	6	0	2	2	2	0	36
Galveston	0		0	4	3	4	0	0	1	0	18
Houston	16		0	107	17	0	5	3	3	0	70
San Antonio	4		6	14	7	3	0	6	0	0	69
Montana:											
Billings	0		0	2	0	0	0	0	0	0	6
Great Falls	0		0	30	0	1	0	0	0	8	8
Helena	0		0	0	0	0	0	0	0	0	5
Missoula	0		0	0	0	5	0	0	0	0	2
Idaho:											
Boise											
Colorado:											
Denver	2	46	0	0	9	15	0	5	1	0	69
Pueblo	0		0	0	1	0	0	0	0	1	11
New Mexico:											
Albuquerque	0		0	0	0	2	0	4	0	1	9
Arizona:											
Phoenix	0		0	6	5	10	0	0	0	0	
Utah:											
Salt Lake City	0		0	3	0	8	0	2	1	7	34
Nevada:											
Reno	0		0	0	0	0	0	1	0	0	3

City reports for week ended March 11, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Washington:											
Seattle	0	------	------	1	------	8	0	------	0	0	------
Spokane	0	------	------	0	------	1	0	------	0	0	------
Tacoma	0	------	0	1	3	2	0	0	0	2	42
Oregon:											
Portland	2	------	3	5	4	2	2	1	0	0	74
Salem	0	4	------	53	------	0	0	------	0	0	------
California:											
Los Angeles	21	32	6	406	11	70	23	14	3	35	213
Sacramento	0	3	1	0	5	16	0	3	0	14	29
San Francisco	2	21	1	2	12	9	0	9	0	85	169

State and city	Meningococcus meningitis		Poliomyelitis cases	State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
New York:				Nebraska:			
New York	7	1	0	Omaha	1	0	0
New Jersey:				Kansas:			
Newark	1	0	0	Wichita	1	1	0
Pennsylvania:							
Philadelphia	1	3	1	Maryland:			
Pittsburgh	2	1	0	Baltimore	0	0	1
Reading	1	0	0	North Carolina:			
				Raleigh	0	2	0
Indiana:				Georgia:			
Indianapolis	-	0	0	Atlanta	2	0	0
Illinois:							
Chicago	13	11	0	Louisiana:			
Michigan:				New Orleans	1	0	0
Flint	1	0	0				
Wisconsin:				Colorado:			
Milwaukee	1	0	0	Denver	2	2	0
				Utah:			
Iowa:				Salt Lake City	2	0	0
Sioux City	1	0	0				
Missouri:				California:			
Kansas City	2	5	0	Los Angeles	2	1	0
St. Joseph	2	1	0				

Lethargic encephalitis.—Cases: New York, 2; Trenton, 1; Philadelphia, 1; Chicago, 1; Baltimore, 1.

Pellagra.—Cases: Philadelphia, 1; Charleston, S. C., 1; Savannah, 1; Memphis, 1; Birmingham, 1; Dallas, 1; Los Angeles, 1.

Typhus fever.—Cases: Charleston, S. C., 1; Savannah, 1.

FOREIGN AND INSULAR

GREAT BRITAIN

Scotland—Vital statistics—Quarter ended December 31, 1932.—The Registrar General of Scotland has published the following statistics for the fourth quarter of the year 1932:

Population (estimated)	4, 880, 000
Births	21, 653
Birth rate per 1,000 population	17. 7
Deaths	16, 812
Death rate per 1,000 population	13. 7
Marriages	8, 262
Deaths under 1 year	1, 895
Deaths under 1 year per 1,000 births	88
Deaths from—	
Bronchitis	996
Broncho-pneumonia	838
Cancer	1, 886
Cerebrospinal fever	46
Diabetes	184
Diphtheria	100
Dysentery	1
Deaths from—Continued.	
Erysipelas	36
Heart disease	2, 509
Influenza	554
Lethargic encephalitis	25
Measles	7
Nephritis, acute	64
Nephritis, chronic	308
Paratyphoid fever	1
Pneumonia	248
Pneumonia, lobar	391
Poliomyelitis	8
Puerperal sepsis	58
Scarlet fever	71
Syphilis	21
Tetanus	2
Tuberculosis	914
Typhoid fever	8
Whooping cough	138

LATVIA

Communicable diseases—November, December, 1932, January, 1933.—During the months of November and December, 1932, and January, 1933, cases of certain communicable diseases were reported in Latvia as follows:

Disease	Cases			Disease	Cases		
	November, 1932	December, 1932	January, 1933		November, 1932	December, 1932	January, 1933
Cerebrospinal meningitis	4	2	5	Paratyphoid fever		8	12
Diphtheria	158	143	81	Poliomyelitis	1	1	4
Erysipelas	19	19	21	Puerperal septicemia		12	6
Influenza	191	154	212	Scarlet fever	92	62	64
Leprosy		1	1	Tetanus	1		
Lethargic encephalitis			1	Trachoma	88	93	74
Measles	107	444	490	Typhoid fever	89	57	113
Mumps	99	44	128	Whooping cough	91	44	79

PUERTO RICO

Communicable diseases—Four weeks ended February 25, 1933.—During the four weeks ended February 25, 1933, cases of certain communicable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chicken pox	50	Ophthalmia neonatorum	1
Diphtheria	60	Pellagra	14
Dysentery	945	Puerperal fever	3
Erysipelas	8	Syphilis	173
Filariasis	5	Tetanus	7
Framboesia, tropical	3	Tetanus, infantile	10
Influenza	241	Trachoma	39
Leprosy	6	Tuberculosis	486
Malaria	3,345	Typhoid fever	19
Measles	226	Whooping cough	121
Mumps	20		

SWITZERLAND

Communicable diseases—Years 1928–1932.—During the years from 1928 to 1932, inclusive, cases of communicable diseases were reported in Switzerland as follows:

Disease	Cases				
	1928	1929	1930	1931	1932
Cerebrospinal meningitis	62	65	58	53	71
Chicken pox	2,012	1,748	1,939	1,776	2,218
Diphtheria and croup	3,193	3,723	4,545	2,611	2,265
Dysentery	2	3	5	6	4
Erysipelas	123	142	140	82	102
German measles	230	172	62	37	37
Influenza	10,000	32,632	405	39,814	35,117
Lethargic encephalitis	46	27	13	23	8
Measles	11,860	3,606	3,471	9,152	5,500
Mumps	936	855	475	620	1,077
Paratyphoid fever	60	32	97	187	92
Poliomyelitis	101	229	105	351	123
Scarlet fever	3,118	3,259	2,983	2,757	3,317
Smallpox	1		1		2
Tuberculosis				1,465	2,711
Trachoma	27	27	11	12	9
Typhoid fever	226	201	130	147	174
Typhus fever	1				
Whooping cough	2,729	1,802	2,200	1,744	2,929

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Hygiene, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; D, deaths; P, present]

Place		Aug. 21–Sept. 17, 1932	Sept. 18–Oct. 15, 1932	Oct. 16–Nov. 12, 1932	Nov. 13–Dec. 10, 1932	Week ended— December, 1932			January, 1933				February, 1933				March, 1933	
						17	24	31	7	14	21	28	4	11	18	25	4	11
Baluchistan	C	1																
	D	2																
China:																		
Amoy	C	160	34			6												
	D	40	12															
Canton	C	22	17		1													
Hankow	C	209	4															
Hong Kong	C	25	2															
Kwantung Leased Territory—District of Port Arthur	C		1															
Macao	C	9	1															
	D	9	1															
Nanking	C	258	12															
Shanghai	C	546	35															
Swatow	C	33	30	3														
Tientsin	C	32	1															
Tsinan—Shantung Province	C	P																
Tsingtao	C	36	6															
Chosen	C	17																
India	C	6,312	3,626	2,411	3,453	1,094	1,068	1,237	1,125	945	971							
	D	3,477	2,072	1,336	1,907	591	555	671	530	504	527							
Bombay	C			5							1						1	
Calcutta	C	82	62	69	53	13	11	17	13	27	25	28	30	14	35	41	24	
Rangoon	C	1																
Indo-China (see also table below):																		
Pnom-Penh	C	1	5					1										
Saigon and Cholon	C	1	1	1									2					
Philippine Islands:																		
Cebu Province	C		1												7	8	2	2
Iloilo Province	C	1	16															
	D	1	11															
Leyte Province	C	43	4		7	6	17	14	43	24		31	55	21	7	26	24	23
	D	18	2		7	2	14	5	23	11		20	45	14	6	23	13	21

Manila	C		1															
Samar Province	C	54	48	53	35		7	68	60		121							
	D	34	38	42	26		4	54	43		75							
Siam	C		1	1				1				1						
Straits Settlements: Singapore	C		1															
On vessel: S.S. Taisan Maru en route Tsingtao to Moji	C	1																

Place		August, 1932	September, 1932	October, 1932			November, 1932			December, 1932			January, 1933			Feb. 1–10, 1933
				1–10	11–20	21–31	1–10	11–20	21–30	1–10	11–20	21–31	1–10	11–20	21–31	
Indo-China (French) (see also table above):																
Cambodia [1]	C	10	6	3	1		1			1	1	3				9
	D	5	4	3			1			1		1				6
Cochin-China [1]	C	11	18	4	3	3			1	2	3	3	1	4	2	9
	D	8	16	4	1	2			1	2	3	1	1	1		6

[1] Reports incomplete.

PLAGUE [1]

[C indicates cases; D, deaths; P, present]

Place		Aug. 21–Sept. 17, 1932	Sept. 18–Oct. 15, 1932	Oct. 16–Nov. 12, 1932	Week ended— November, 1932		December, 1932					January, 1933				February, 1933				March, 1933	
					19	26	3	10	17	24	31	7	14	21	28	4	11	18	25	4	11
Angola	C					P												P			
Argentina:																					
Chaco—Villa Angela	C	6																			
Cordoba Province	C								2						1		5				
Jujuy Province	C														10						
La Rioga Province	D			4																	
Salta Province	C			7			12														
San Luis Province [2]	C							P													
Santa Fe	C										1										
Belgian Congo	C								1												

[1] Including plague in the United States and its possessions.
[2] Several cases of plague with 1 death were reported at Quines, San Luis Province, Argentina, on Dec. 9, 1932.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

[C indicates cases; D, deaths; P, present]

Place		Aug. 21–Sept. 17, 1932	Sept. 18–Oct. 15, 1932	Oct. 16–Nov. 12, 1932	Week ended— November, 1932		December, 1932					January, 1933				February, 1933				March, 1933	
					19	26	3	10	17	24	31	7	14	21	28	4	11	18	25	4	11
British East Africa (see also table below):																					
Tanganyika	D		10		1																
Uganda	C	100	95	192	52	46	50	46	34	38	31	38	13	18							
	D	88	91	189	52	24	48	45	34	38	31	31	13	18							
Ceylon: Colombo	C	5	5	9	2	1	3	5	1	2		1	3	1		1	4	1	3	2	11
	D	5	4	8	2	2	2	1	1	2			2			1	2	1	2	2	9
Plague-infected rats		1	3	5						2		2						3	1		
Chile: Antofagasta—Plague-infected rats			1																		
Dutch East Indies:																					
Surabaya	C	1																			
West Java	C	259	418	502	139	117	154	200	208	297	257	290									
	D	258	403	502	139	116	153	200	206	293	246										
Ecuador. (See table below.)																					
Egypt:																					
Alexandria	C	1	4						1			1	1								1
Assiout	C									1	3	2	1	2		1	1	2	1		4
Beheira	C	2	2																		
Beni Suef	C	1																			
Gharbieh	C		2																		
Minieh	C	2	4	1																	
France: Marseille	C										1										
Great Britain: Liverpool—Plague-infected rats			* 1																		
Hawaii Territory:																					
Hawaii Island—																					
Hamakua—Kukaiau	C															1					
	D															1					
Plague-infected rats												2	1	1	4	1					
Paauilo—Plague-infected rats					1				8	1	2										
Maui Island—Makawao	C	1																			
Plague-infected rats		2	1												1						
Omaopio—Plague-infected rats														1							

India	C	3,775	6,028	5,422	1,356	1,811	1,509	1,428	1,958	1,529	1,529	1,884	1,590	1,528							
	D	2,208	3,481	3,074	813	988	825	434	1,224	908	1,018	1,199	1,018	906							
Bassein	C	1	1	1												1			1	1	
Plague-infected rats			1	1				1	1							1	1	1			
Bombay	C	4	1	3															3		
Plague-infected rats		27	30	34	3	5	2	5	1	7	6	2	5	10	6	7	11	21	14	22	
Madras Presidency	C	315	343	266	94	174	114	164	102	115		229	132	168	113						
	D	110	153	92	32	50	47	68	48	69		132	48	53	35						
Rangoon	C	3		2	1	1	1				1					1		1		1	
Plague-infected rats			2										1					1			
Indo-China. (See table below.)																					
Iraq: Baghdad	C	1	1	3		1											1	1		1	
Madagascar. (See table below.)																					
Morocco	C					10			2		8	6							3	1	
Peru. (See table below.)																					
Senegal. (See table below.)																					
Siam	C	6	1	7	1	5	3				2	10	2		4	1	1	1	13		
South-West Africa.[4]																					
Syria: Beirut	C	4	4	9	5	6	1														
Union of South Africa: Orange Free State	C	1	P	P	P				P	P	P		1	1	1						
United States: California—San Benito County—Plague-infected ground squirrels													1								
On vessels:																					
S. S. City of Oxford at Liverpool from Alexandria—Plague-infected rats		1																			
S. S. Figuig at Marseille from Bona and Philippeville	C	1																			
S. S. Patris at Beirut	C			3																	

[3] At dock where steamship City of London was berthed.

[4] 227 cases of plague with 53 deaths were reported in Ovamboland, South-West Africa, up to Dec. 17, 1932. Antiplague measures have been taken.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

[C indicates cases; D, deaths; P, present]

Place		August, 1932	September, 1932	October, 1932	November, 1932	December, 1932	January, 1933	February, 1933
British East Africa (see also table above): Kenya	C	30	15	7	5	8	6	
Ecuador:								
Province—								
Loja	C		4				1	
Indo-China	C	2		1	2	3	4	2
	D	2		1	2	3	2	2
Madagascar:								
Province—								
Ambositra	C	9	30	35	41			
	D	8	28	34	35			
Antsirabe	C	45	42	73	25			
	D	45	41	73	25			
Maevatanana	C	1			8			
Miarinarivo	C	5	8	19	35			
	D	5	8	19	34			
Moramanga	C	4	52	225	229			
	D	4	49	208	228			
Tamatave	C	2		1	1	1		
	D	2		1	1	1		
Tananarive	C	35	75	178	209			
	D	35	75	173	169			

Place		August, 1932	September, 1932	October, 1932	November, 1932	December, 1932	January, 1933	February, 1933
Peru	C				10	12	4	12
Department—								
Ancachs	C				[5] 2			
Lambayeque	C	1						
Libertad	C			1	[5] 2			
Lima	C		2	5	8			
Piura	C				[5] P			
Senegal:								
Dakar [6]	C	37	7	3	6	19	2	3
	D	28	7	2	4	17	2	3
Louga [6]	C	1	2	9				
	D	1	2	6				
Rufisque [6]	C	23	8					
	D	21	5					
Thies [6]	C	5	15					
	D		11					
Tivaouane [6]	C		6					
	D		7					

[5] Suspicious cases.
[6] Reports incomplete.

SMALLPOX

[C indicates cases; D, deaths; P, present]

Place		Aug. 21–Sept. 17, 1932	Sept. 18–Oct. 15, 1932	Oct. 16–Nov. 12, 1932	Week ended— November, 1932 19	November, 1932 26	December, 1932 3	December, 1932 10	December, 1932 17	December, 1932 24	December, 1932 31	January, 1933 7	January, 1933 14	January, 1933 21	January, 1933 28	February, 1933 4	February, 1933 11	February, 1933 18	February, 1933 25	March, 1933 4	March, 1933 11
Aden	C			1	1	2			1							2			1		
Algeria: Algiers	C	1	1	2	1					1											
Argentina:																					
Chaco Territory	C																		P		
Formosa Province	C	P																			
Jujuy Province	C			1																	
Belgian Congo	C	288					51	71	88												
Belgium	C			1																	
Bolivia: Potosi	C										5										
Brazil:																					
Parahyba—Joao Pessoa	C						P														
Pernambuco—Recife	C						P														
Porto Alegre (alastrim)	C	14	41	26		5	2	1	2	9	1	4			1						
British East Africa: Tanganyika	C	95	65	74	14	23	27	2	9	28	6	6	42	15							
British South Africa:																					
Northern Rhodesia	C			40						3	3									1	
Southern Rhodesia	C		1	27		1			1				14								
Canada:																					
Alberta	C					1															
Manitoba	C			2																	
Ontario	C	3						3	10			3									
Toronto	C							3	3												
Saskatchewan	C	1	6				1	2		1					3	2	22		9		
Ceylon: Colombo	C						23	5	23	3	27	19	14	22	12	27	18	7	5	4	1
China:																					
Amoy	C															1	1	1	2		
Canton	C	1	2	28	14	15	79	72	130	213	198	221	189	151	101	63	85	86	41	22	26
	D	1		2	1	1	9	3	3	8	6	6	4		7	2		1			
Chemulpo	C																17				
Dairen	C						1	1				1	2		2						
Foochow	C	P	P	P		P			P			P				P		P			
Hong Kong	C	P					1	1		3	5	10	10	22	14	32	32	28	63	46	53
Macao	C										P		1		1	1	2	2	2	2	
Nanking	C		2				6				11		13	13	12						
Shanghai	C			5	1	7	4	1	4	5	4	10	14	6	12	9		17	9	2	16
Swatow	C		1	4	2		1	5		2		5		10	5	7	9	8	2		

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths; P, present]

Place		Aug. 21–Sept. 17, 1932	Sept. 18–Oct. 15, 1932	Oct. 16–Nov. 12, 1932	Week ended— November, 1932		December, 1932					January, 1933				February, 1933				March, 1933	
					19	26	3	10	17	24	31	7	14	21	28	4	11	18	25	4	11
Chosen. (See table below.)																					
Colombia: Cali	D						1														
Dahomey	C	6	2	6							5		7				21				
Dutch East Indies	C	1	1	2												1					
Egypt:																					
Alexandria	C	12	17	23	8		12	42	79	131	154	219	237	231	192	327	301	300	195	147	104
	D	4	9	13	4		2	9	14	22	47	33	46	52	59	70	52	56	40	35	25
Cairo	C				1				1		2	5	4	14	14	5	6	9	9		
Gharbieh	C										13	24									
Port Said	C													1		1					1
Suez	C													1	1					4	1
Gold Coast. (See table below.)																					
Great Britain:																					
England and Wales	C	51	59	116	16	14	27	15	28	16	19	16	18	16	14	18	25	20	22	9	
London	C	17	56	76	15	13	25	15	26	16	17	14	17	14	13	15	22	16	20	8	
London and Great Towns	C	38	53	110	16	14	28	15	27	16	18	15	18	16	14	18	24	20	22	9	
Greece. (See table below.)																					
Honduras:																					
Puerto Castilla	C		1		1																
Tegucigalpa	D	1																			
Tela	C	1	2	2		1				1		1		1	3		3	1	2		1
India	C	3,955	3,234	4,179	1,706	1,606	2,057	2,550	2,616	2,309	2,953	3,406	3,936	4,525							
	D	1,035	722	1,013	425	448	614	752	754	710	997	1,062	1,098	1,376							
Bassein	C																2	1	2	2	
	D																	1		1	
Bombay	C	32	27	33	10	14	20	43	58	44	54	74	93	199	219	294	332	408	377	405	
	D	21	20	15	3	4	10	18	3	20	29	46	49	85	97	160	164	210	206	215	
Calcutta	C	23	22	53	19	14	26	44	59	70	91	81	119	259	205	378	322	399	533	383	
	D	8	14	24	8	5	16	18	40	36	80	57	65	200	154	253	263	213	355	316	
Cochin	C			1																	
Karachi	C	2	1			4	1	9	9	2	2	12	6	11	15	13	8	15	13	11	
Madras	C	51	89	140	24	26	36	33	55	33	24	44	55	87	102	107	117	104	130	213	
Moulmein	C	3															1				
Negapatam	C		2	3	2	2						2		2	1		1		1		
Rangoon	C		1	3	1		1		2		1		2		1	2	1	6	3	10	
Tuticorin	C	7	19	12	8		5														
Vizagapatam	C											1									

India (French): Pondichery Territory	C	18	13		2		1				2										
Indo-China (see also table below): Saigon and Cholon	C	4	2	1					1		1							2		1	
Iraq:																					
Baghdad	C	6	6	10	14	12	4	1	6	4	1	2	2	3	3		2	1	1		1
Basra	C	6	33	85	27	22	19	13	11	4	6	4	1	1	1	3	2		1		
Japan: Osaka	C																1	1	1		
Mexico:																					
Coahuila	C																			1	
Juarez	C																3				
Mexico, D. F.	C	9	4	4	1	1							2		3	5	3	1			
Monterrey	C			1																	
Saltillo	D	2		3	2	4	1	4	4	1	1	2	4				1	3			1
San Luis Potosi	D			3					1			1									
Torreon	C		5	1																	
Morocco. (See table below.)																					
Nigeria	C	83	58	56	1,288			293		487		96	335								
Persia	C	93	189	464	89	90	67	95	64	52	53	47	28	29	37	14		14			
	D	46	94	166	36	41	32	41	25	24	15	13	14	7	18	2		3			
Peru. (See table below.)																					
Poland	C								1												
Portugal:																					
Lisbon	C	9	9	5	1	3	1	4	7	3		2		1	1	2	3				
Oporto	C	18	5	1	4	2	4	4		3	4	2		1	2	2	2				
Siam: Bangkok	D														1	1		1	1		
Sierra Leone	C	16				3		10				10		89		128					
Straits Settlements	C	2																			
Sudan (Anglo-Egyptian)	C	1		8		5								13		44	13	12	4	5	19
Syria. (See table below.)																					
Turkey. (See table below.)																					
Union of Socialist Soviet Republics. (See table below.)																					
Union of South Africa:																					
Cape Province	C		P	P	P	P	P	P	P	P											
Orange Free State	C	P	P	P			P														
Transvaal	C					P		P	P												
Zanzibar	C																	2			
On vessels:																					
S. S. Amassis at Alexandria	C												1								
S. S. British Engineer at Marseille	C							1													
S. S. Somersetshire at Suez	C													1							
S. S. British Splendour en route to Gibraltar	C				1																
S. S. Jervis Bay en route to Southampton	C				1																
	D				1																
S. S. Star of Alexandria at Alexandria	C									1											
S. S. Kohistan at Aden from Basra	C				1																
S. S. Bahadur at Madras from Calcutta	C												1								
S. S. Volturno at Alexandria	C																			1	

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths; P, present]

Place		August, 1932	September, 1932	October, 1932	November, 1932			December, 1932			January, 1933			February, 1933	
					1-10	11-20	21-30	1-10	11-20	21-31	1-10	11-20	21-31	1-10	11-20
Indo-China (see also table above)	C	147	127	157	50	73	57	38	68	107	168	65	20	29	98
	D	61	62	46	19	13	19	15	11	19	38	17	3	16	33
Syria: Beirut	C	1			4	17	20	4	28	17	5	10	19	11	8

Place		August, 1932	September, 1932	October, 1932	November, 1932	December, 1932	January, 1933
Chosen	C	5					17
	D	3					
Gold Coast	C			3			
Morocco	C	19	24	33	53	81	14
Peru	C	35	166	75	67		
Turkey	C	30	13	13			5
	D	3	4	1			
Union of Socialist Soviet Republics	C	538	786				

TYPHUS FEVER

[C indicates cases; D, deaths; P, present]

Place		July 24–Aug. 20, 1932	Aug. 21–Sept. 17, 1932	Sept. 18–Oct. 15, 1932	Oct. 16–Nov. 12, 1932	Week ended— November, 1932		December, 1932					January, 1933				February, 1933			
						19	26	3	10	17	24	31	7	14	21	28	4	11	18	25
Algeria:																				
Algiers	C	10	34	11	7		2								1	2	1	1		
Bone	C			2						1					1			1		
Constantine Department	C	20					2		1					1		2		1	3	34
Argentina: Buenos Aires	C		1													6				
Bolivia (see table below).																				
British East Africa: Uganda	C			16	19	4			12		15	2		3						
Bulgaria	C	4	1					2	10	5				2						
Chile (see also table below):																				
Antofagasta	C				1												1		1	
Santiago	C		22	61	41	4		90	72	45	48	73	52							
Talcahuano	D	1																		
China: Hankow	C													3						
Chosen. (See table below.)																				
Colombia: Cali	D			1		1														
Egypt:																				
Alexandria	C	1	5										1	1						
Beheira	C	15		21				2									40			
Gharbieh	C		1	1																
Port Said	C	3	1	1	1	1														
Provinces	C	49	6	3								33	26	28			143			
Greece. (See table below.)																				
Guatemala. (See table below.)																				
Irish Free State:																				
Cork County—																				
Bandon	C			1																
Schull	C	1																		
Dublin	C			2																
Kerry County—																				
Dingle	C		1																	
Killarney district	C				1		16			2	3									
Lithuania. (See table below.)																				
Mexico:																				
Mexico, D. F.	C	4	10	3	11	6	1	2	1	2	1					2		3	6	
Monterrey	C	1																		
Torreon	C		6			1	1													

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER—Continued

[C indicates cases; D, deaths; P, present]

Place		July 24–Aug. 20, 1932	Aug. 21–Sept. 17, 1932	Sept. 18–Oct. 15, 1932	Oct. 16–Nov. 12, 1932	Week ended— November, 1932: 19	November, 1932: 26	December, 1932: 3	December, 1932: 10	December, 1932: 17	December, 1932: 24	December, 1932: 31	January, 1933: 7	January, 1933: 14	January, 1933: 21	January, 1933: 28	February, 1933: 4	February, 1933: 11	February, 1933: 18	February, 1933: 25
Morocco	C	8	7	2		2	4	7	9	17	1	9	16	10	9	14	30	4	4	66
Palestine	C		6	5	2		1	1				1		1						1
Persia	C	7	6	16	2	1	6		4	3	4	2	7	3	3	6	4	7	13	
Peru. (See table below.)																				
Poland	C	29	26	120	63	13	14	17	21	32	11	55	54	40	68	74	95	86	77	
	D	2	2	9	13	2	1	2	1	4		3	1	6	9	4	7	6	4	
Portugal: Oporto	C			1																
Rumania	C	20	17	9	7	22	17	46	36	66	66	43	79	59	89	71				
Tunisia: Tunis	C	6							1		9			4	6	25		1	20	8
Turkey (see also table below): Istanbul	C	4	1	1	1					1		1	1			5				
Union of Socialist Soviet Republics. (See table below.)																				
Union of South Africa:																				
Cape Province	C	P	P	P	P	P	P		P	P	P	P	P	P	P	P				
Natal	C			P	P	P	P		P	P	P	P	P	P						
Orange Free State	C	P	P	P	P		P		P	P	P	P	P	P	P	P				
Transvaal	C						P					P	P	P	P	P				
Yugoslavia. (See table below.)																				
On vessel: S. S. Munplace at New Orleans from Progresso	C															1				

Place		August, 1932	September, 1932	October, 1932	November, 1932	December, 1932	January, 1933	February, 1933
Bolivia	C					4	29	
Chile: Coquimbo Province	C				60			
Greece	C	14	15	4		15	10	
Guatemala	C	2	9			3	6	
Lithuania	C		5		1	10	36	13
Peru	C	37	50	81	75	111		
Turkey	C	8	6	11	15	14	23	
Union of Socialist Soviet Republics	C	2,068	2,639					
Yugoslavia	C	1			3	11	35	97

YELLOW FEVER

[C indicates cases; D, deaths; P, present]

Place		Aug. 21–Sept. 17, 1932	Sept. 18–Oct. 15, 1932	Oct. 16–Nov. 12, 1932	Week ended—															
					November, 1932		December, 1932					January, 1933				February, 1933				Mar. 4, 1933
					19	26	3	10	17	24	31	7	14	21	28	4	11	18	25	
Brazil:																				
Ceara State	C	1	1	1				1												
	D	1	1																	
Parahyba State	D	2	1																	
Pernambuco State	D	3	1																	
Piauhy State	D								1											
French West Africa: Guinea	C			2	1	2		1												
	D			2	1	2		1												
Gold Coast	C																	1		1
	D																	1		1
Guinea (Portuguese): Bissagos Islands	C												43							
	D												13							
Senegal	C			8																
	D			5																
Bakel—Kidira	C		6																	
	D		5																	
Upper Gambia	C		3																	
	D		2																	
Sudan (French): Keyes	C			4		1	1													
	D			4		1	1													

×

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UNITED STATES PUBLIC HEALTH SERVICE

HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst. Surg Gen R C. WILLIAMS, *Chief of Division*

The PUBLIC HEALTH REPORTS are issued weekly by the United States Public Health Service through its Division of Sanitary Reports and Statistics, pursuant to acts of Congress approved February 15, 1893, and August 14, 1912.

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THE ACTION OF HEAVY METALS ON CYSTEINE AND ON SULPHYDRYL GROUPS OF PROTEINS

By SANFORD M ROSENTHAL, *Senior Pharmacologist*, and CARL VOEGTLIN, *Chief of Division of Pharmacology, National Institute of Health, United States Public Health Service*

I. BREAKDOWN OF THE CYSTEINE MOLECULE BY COPPER

The oxidation of cysteine by molecular oxygen in the presence of iron has been carefully studied in recent years and the factors influencing this reaction are well known. It has been shown by Warburg and Sakuma (1) that the oxidation of cysteine is dependent on the presence of a heavy metal catalyst, and that under the influence of iron, cysteine in neutral or slightly alkaline solution is oxidized to cystine. The reaction does not go further, and cystine in aqueous solutions is quite stable in the presence of iron. Warburg and Negelein (2) showed that aqueous suspensions of blood charcoal (containing iron, nitrogen, and carbon) had the property of oxidizing cysteine, cystine, and other amino acids, so that the final products were the end products of oxidations in the animal body—carbon dioxide, ammonia, and sulphuric acid.

It was shown by Voegtlin, Rosenthal, and Johnson (3) that copper can oxidize reduced crystalline glutathione solutions to the disulphide compound, while iron, manganese, and certain other heavy metals are without such an effect.

It is generally assumed that copper behaves similarly to iron in the oxidation of cysteine, and that in aqueous or buffer solutions the reaction proceeds only to the formation of cystine. We have found, however, that small amounts of copper can cause a breakdown of the cysteine molecule so that carbon dioxide, ammonia, and sulphuric acid can be recovered as end products.

METHODS AND MATERIAL

The cysteine hydrochloride was prepared by recrystallization from a commercial sample, and purification by Warburg's method (7) to render it free from heavy metals.[1] The water employed for making

[1] This was done by Dr. J. M. Johnson of the National Institute of Health.

in borate buffer the oxygen uptake corresponded very closely to the amount needed for oxidizing cysteine to cystine. We have repeated this experiment in pyrophosphate buffer and obtained similar results. The ability of copper to cause the oxidative breakdown of the cysteine molecule is abolished in pyrophosphate buffer, while its ability to oxidize cysteine to the disulphide compound is retained. (Chart 3.) Indeed, Elvehjem (6) has shown that the oxidation of cysteine to cystine by copper is enhanced in pyrophosphate as compared with that obtained in phosphate buffer solutions.

Experiments were done next to show the production of carbon dioxide during the oxidation of cysteine by copper in phosphate buffer. An experiment was run under the following conditions: 4 mg cysteine hydrochloride in phosphate buffer of pH 7.5, tem-

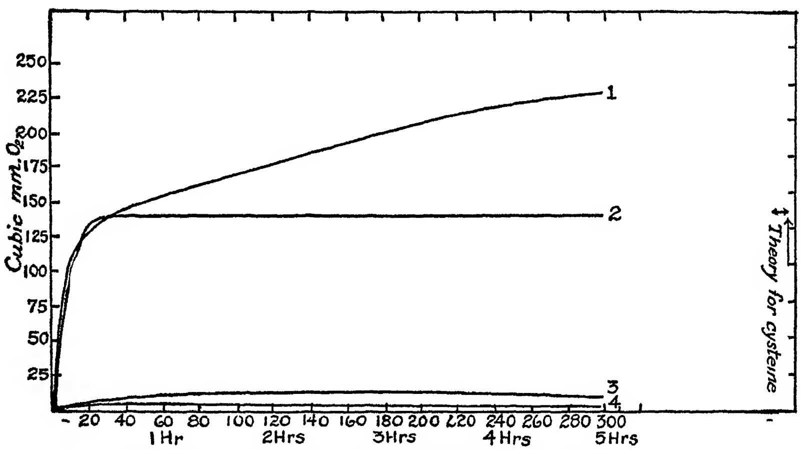

CHART 3.—The ability of pyrophosphate solutions to prevent the oxidation of cysteine by copper beyond the S–S stage. The stability of cystine toward Cu and Fe is not affected by the addition of a small amount of cysteine. Curve 1, 4 mg cysteine +0.01 mg Cu in phosphate buffer, pH 7.3. Curve 2, in pyrophosphate buffer at pH 7.6. Curve 3, 10 mg cystine +0.1 mg cysteine +0.1 mg Cu, phosphate buffer pH 7.3. Curve 4, 10 mg cystine +0.1 mg cysteine +0.1 mg Fe, phosphate buffer pH 7.3. Volume of solutions 2.5 cc.

perature 41° C., 0.1 mg copper, and an atmosphere of oxygen. At the end of 6 hours 746 cu mm, or 5.2 times the amount of oxygen necessary for the formation of the S–S compound, had been consumed and 385 cu mm of carbon dioxide produced. (Chart 4.) The oxidation had not been completed at the end of that time. For the complete oxidation of 4 mg of cysteine hydrochloride to CO_2, ammonia, and sulphuric acid, 2,559 cu mm of oxygen would be required and 1,714.5 cu mm of CO_2 would be produced. In this experiment, therefore, at the end of six hours there was 29 per cent of the oxygen consumed and 22 per cent of the CO_2 produced that would be required for the complete oxidation of the cysteine. These values are the same as those obtained by Warburg and Negelein (2) for the oxidation of cysteine on blood charcoal under conditions

of temperature, oxygen tension, etc., comparable to those of our experiment.

Other observations dealing with the products of oxidation of cysteine by copper may be summarized as follows:

(A) To 5 grams of cysteine hydrochloride in 25 c c water brought to pH 7.3, were added 50 mg of copper. The solution in an Ehrlenmeyer flask of 300 c c capacity was placed in an incubator at 37.5° C. A mechanism in the incubator permitted the flask to be slowly tipped from side to side. After 3 days the precipitate was tested by Doctor Johnson for cysteic acid, after the method of Friedmann (7), with negative results.

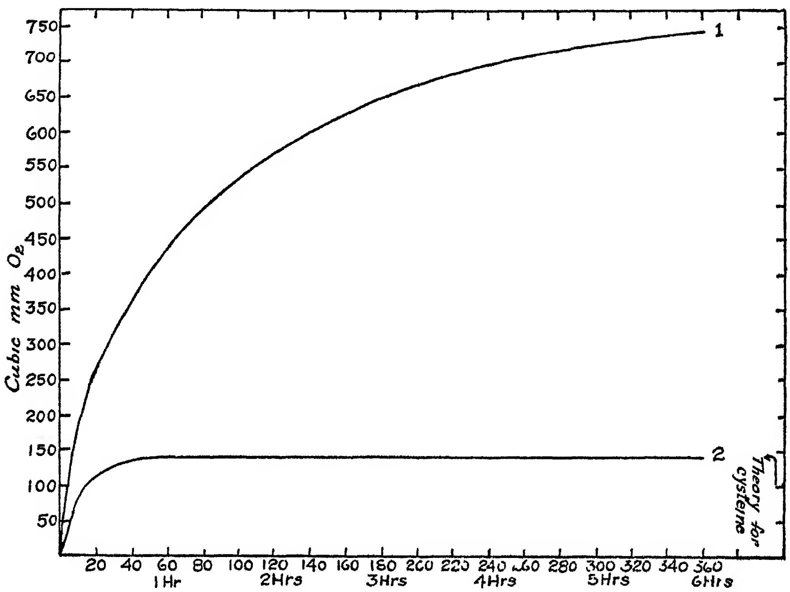

CHART 4.—The effects of copper and of manganese upon 4 mg of cysteine HCl in phosphate buffer, pH 7.5 at 41° C and in an atmosphere of oxygen. Curve 1, cysteine + 0.1 mg Cu (as cupric ammonium sulphate). Separate determinations showed that 385 cu mm of CO_2 were produced in the 6-hour period. Curve 2 cysteine + 0.1 mg manganese (as $MnSO_4$). No CO_2 was produced.

(B) 250 mg of cysteine hydrochloride were dissolved in water, adjusted to pH 7.5 and made up to 500 c c. The solution was equally divided into two half-liter flasks. To one was added 3.1 mg of copper (as cupric chloride) and to the other 3.1 mg of iron (as ferric chloride). Oxygen was run into the stoppered flasks, they were placed in a water bath at 41° C. and shaken for nine hours. Several replacements of oxygen were made during this time. At the end of this period, determinations of ammonia were run by Folin's method and of sulphates by the barium sulphate method.

Ten c c of the solution oxidized by copper contained 0.1 mg of ammonia. This represents 19 per cent of the amount that would be

found if the cysteine were completely broken down into carbon dioxide, ammonia, and sulphuric acid. The solution oxidized by iron contained no ammonia.

Two hundred and forty c c of the solution oxidized by copper contained 0.19 mg of sulphur which could be precipitated as barium sulphate after acidification of the solution with hydrochloric acid. This represents, therefore, a recovery of 0 8 per cent of the total sulphur as sulphuric acid. In the cysteine solution oxidized by iron no sulphuric acid could be detected.

(C) When copper is allowed to oxidize cysteine in phosphate buffer or water, the solution turns dark brown, suggesting an oxidation of the amino group. This does not occur with iron or manganese.

(D) When cysteine is slowly oxidized by iron, crystals characteristic of cystine are obtained. When copper is employed there are present several kinds of crystals. Those predominating are small thick irregular needles arranged in thick clumps or bundles. A few characteristic cystine crystals are usually present. The nitroprusside test in the presence of cyanide is strongly positive, revealing the presence of a disulphide compound.

Action of copper upon cystine.—We were first of the opinion that the action of copper was to oxidize cysteine to cystine and that the further oxidation which occurred was due to a breakdown of the cystine. Such a mechanism would require that cystine under the conditions of these experiments be oxidized by copper. This is not the case. When 20 mg of cystine were added to phosphate buffer at pH 6.6, or pH 7.3, no uptake of oxygen results from the addition of 0.1 mg of copper or iron. (Chart 2.)

The possibility remained that the cysteine-copper combination formed a catalytic system capable of oxidizing cystine. To test this hypothesis, respiration vessels were set up containing 10 mg of cystine and 0.1 mg of copper in phosphate buffer at pH 7.3. After readings were begun, 0.1 mg of cysteine hydrochloride was added from the side arm. The oxygen consumption after five hours was 11 cu mm or three times the amount required to oxidize 0.1 mg of cysteine to cystine. (Chart 3.) This oxygen uptake can therefore be accounted for by the action of copper on the cysteine present. There is no evidence that any of the cystine originally present in the solution was oxidized by the copper.

The negative results of these experiments suggest that the breakdown of cysteine by copper involves not only an oxidation of the SH radical but also an action upon another part of the cysteine molecule. In such a process cystine would not necessarily be an intermediate step in the reaction.

Action of iron and manganese upon cysteine.—In accordance with the results of previous workers, we have found that iron, when added

to cysteine in neutral or slightly alkaline solutions, brings about an oxidation to the cystine stage at which point the oxidation ceases. This is true in water, in phosphate buffer, and when iron is added to 10 mg of cystine containing 0.1 mg of cysteine (Charts 1, 2, 3.) The presence of iron does not appreciably alter the action of copper upon cysteine in phosphate buffer. (Chart 1.)

Warburg (4) has shown that manganese is an active catalyst of the oxidation of cysteine in borate buffer solutions, but the total oxygen uptake was not reported. However, we have found that manganese is not a very active catalyst in water or phosphate buffer at hydrogen ion concentrations near neutrality, at 37.6° C. and in an atmosphere of air. When 0.1 mg of manganese (as manganous sulphate) was added to 4 mg of cysteine in phosphate buffer at pH 6.6 and 7.1, or to 4 mg of cysteine in water at pH 7.1, the oxidation to cystine was not completed after 11 hours of shaking (Chart 5), and the nitroprusside

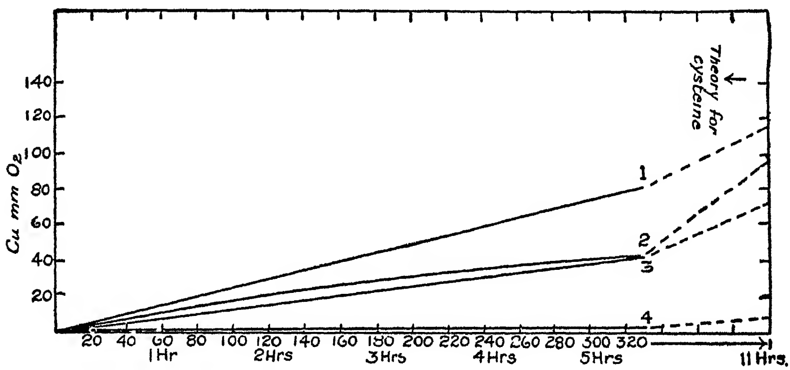

CHART 5.—The feeble catalytic activity of manganese upon cysteine in water or phosphate buffer. Curve 1, 4 mg cysteine + 0.1 mg Mn in water at pH 7.1. Curve 2, in phosphate buffer at pH 7.3. Curve 3, in phosphate buffer at pH 6.6. Curve 4, cysteine alone in water at pH 7.1.

test on the solutions were still positive after this time. However, in an experiment run at 41° C. in an atmosphere of oxygen, and in phosphate buffer solution at pH 7.5, it was found that the oxygen consumption ended with the amount required for the formation of cystine. (Chart 4.)

II. THE ACTION OF HEAVY METALS UPON THE FIXED SULPHYDRYL GROUPS OF PROTEINS

For the purpose of studying the oxidation of the SH groups of proteins, twice recrystallized egg albumin was employed. The ammonium sulphate was removed by dialysis in a stream of distilled water for two days at 3° C. This was accomplished by preparing a glass jacket that encased the collodion sacs with a few millimeters' clearance so that when the sac was in place 10 to 20 c c of water would fill

the jacket to overflowing The water was conducted to the bottom of the jacket through a fine glass tube placed in the space between the collodion sac and the jacket About 20 liters of water were used in 24 hours. The rate of dialysis was greatly accelerated by a motor-driven stirring rod placed in the albumin solution.

Tests were made for ammonium sulphate by precipitating the albumin solution with trichloracetic acid and by adding a drop of Nessler's solution to a drop of the filtrate. In determining the nitrogen content, the trichloracetic acid precipitate was washed upon filter paper with trichloracetic acid until the filtrate gave no color with Nessler's reagent.

To bring out the sulphydryl groups in the dialyzed albumin, sodium chloride was added to make 0.8 per cent, and the solution was coagulated by immersion in boiling water with stirring for three to five minutes. It was then rapidly cooled and pipetted into the respiration vessels.

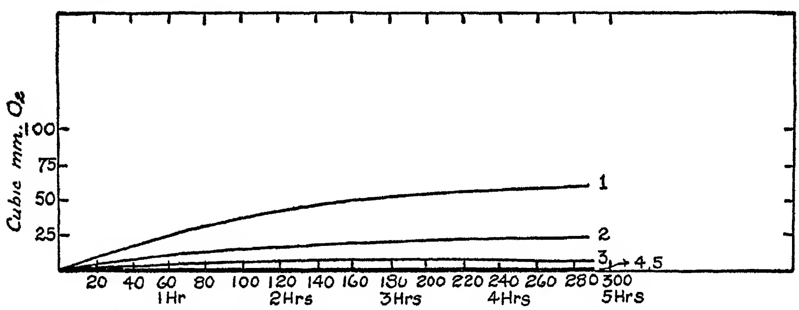

CHART 6 —The oxygen uptake of coagulated crystalline egg albumin brought about by copper and the lack of effect of iron Curve 1, 60 mg coagulated albumin +0 2 mg copper (as citrate) Curve 2, albumin +0 02 mg Cu Curve 3, albumin +0 002 mg Cu Curve 4, albumin +0 5 mg Fe (as citrate) Curve 5, albumin alone Experiments run in aqueous solutions at pH 7 8 Total volume of fluid 2 5 c c.

Effects of iron and copper on egg albumin.—For the purpose of this study cupric and ferric citrate, cupric and ferric ammonium sulphate, cupric and ferric sulphate, and cupric and ferric chloride were employed. The ferric salts were analyzed by Dr. J. M. Johnson for the presence of copper and found to contain amounts of no significance for this work.

The sulphydryl groups of egg albumin are more resistant to oxidation than those of glutathione and cysteine. This is shown by the fact that in slightly alkaline solution (pH 7 to 8) the coagulated albumin may be kept at room temperature, exposed to air, for one to two weeks before the nitroprusside test disappears. It is also manifested by the larger amounts of copper required to bring about their oxidation.

We have found that among the heavy metals only copper and manganese can bring about an oxidation when added to coagulated

egg albumin. With copper the oxidation involves a breakdown of the protein molecule with the liberation of carbon dioxide, while with manganese less oxygen is consumed and no carbon dioxide formed.

The ability of copper to bring about the oxidation of the coagulated egg albumin, and the ineffectiveness of iron, is shown in Chart 6. From 0.002 to 0.2 mg of copper (as citrate) and 0.5 mg of iron were employed. In this experiment, made at pH 7.8, at 37.6° C. in an atmosphere of air, the maximum oxygen uptake from 60 mg of protein plus 0.2 mg of copper was 46 cu mm in four hours.

The effect of 0.5 mg of copper (as citrate) upon 80 mg of albumin is shown in Chart 7. It is also seen that no uptake of oxygen results when copper is added to the native egg albumin (containing no free sulphydryl groups). This absence of effect of copper upon native albumin suggests that there is no breakdown of the molecule unless the protein contains free sulphydryl groups.

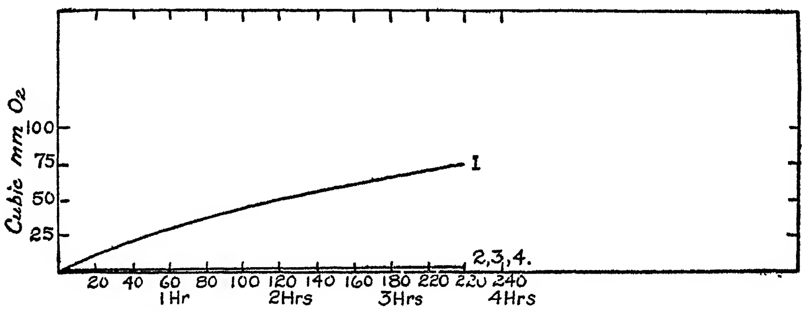

CHART 7.—The inability of copper to bring about an oxidation of egg albumin when in the native state. Curve 1, 81 mg coagulated ovalbumin +0.5 mg Cu (as citrate). Curve 2, 81 mg native albumin +0.5 mg Cu. Curve 3, coagulated albumin +0.5 mg Fe (as citrate). Curve 4, coagulated albumin alone. Experiments in water at pH 7.5. Total volume of fluid 1.5 c.c.

In the above experiments the oxidations did not proceed to completion, and so a further experiment was done in which the rate of oxidation was increased by carrying out the oxidation in an atmosphere of oxygen and at a higher temperature (41° C.). (Chart 8.) Seventy-six mg of coagulated protein to which was added 0.3 mg of copper (as chloride) consumed in five hours 138 cu mm of oxygen, or 1.82 cu mm O_2 per milligram of protein.

Although it is possible to estimate approximately the sulphydryl content of proteins, satisfactory methods for exact quantitative estimation are at present not available. If the cystine sulphur of egg albumin can be taken to represent the maximum amount of sulphur that could be converted into sulphydryl sulphur by denaturation of this protein, then the actual oxygen uptake of the coagulated egg albumin in the presence of copper is greater than that required for the oxidation of SH to S-S groups. Thus, Sullivan (8) found 1.2

per cent of cystine in egg albumin. If this sulphur is expressed as SH (and it is unlikely that all of the cystine sulphur is converted into SH sulphur in the coagulated protein) then the oxygen required to convert it to the S–S state would be 0.472 cu mm per milligram of protein, whereas in this experiment 1.82 cu mm were consumed. Since the analysis of crystalline egg albumin (Calvary) shows that only one-eighth of the total sulphur is present as cystine sulphur, it is also possible that some of this noncystine sulphur may give rise to SH groups upon denaturation of the protein. However, we have obtained proof that the oxidation of the coagulated albumin by copper proceeds further than the oxidation of SH to S–S compounds, in the production of carbon dioxide during the process. An experiment was run upon 76 mg of protein in 4 c c of water at pH 7.4; temperature of 41° C. and in an atmosphere of oxygen; 0.3 mg of copper was added before readings were begun so that the measure-

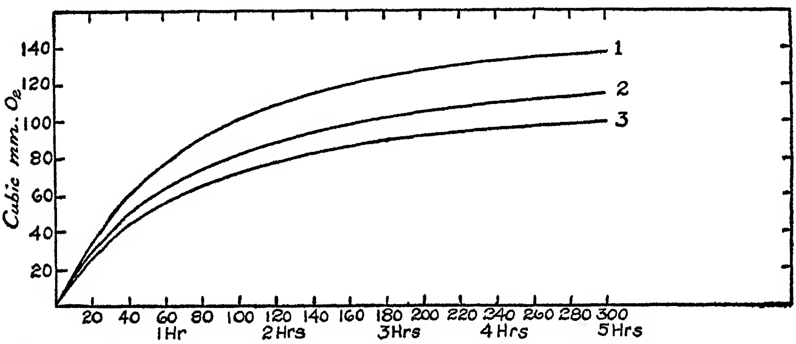

CHART 8.—The oxygen consumption and CO_2 production of 76 mg coagulated egg albumin +0.3 mg Cu (as $CuCl_2$) in an atmosphere of oxygen and at 41° C. Curve 1, total O_2 consumption in 5 hours. Curves 2 and 3, oxygen consumption during a 5 hour period, with and without alkali for absorption of CO_2. The corrected values for this period were 116 cu mm O_2 taken up and 18 cu mm CO_2 produced. Aqueous solutions, pH 7.4, volume of fluid 4.2 to 4.6 c c.

ments do not represent total values. In five hours 116 cu mm of oxygen were consumed and 18 cu mm of carbon dioxide were liberated. (Chart 8.) The ratio of carbon dioxide to oxygen is thus 0.155. This is less CO_2 than was produced from the oxidation of cysteine by copper, where the ratio was 0.561.

Further proof that the oxidation of the albumin by copper does not proceed to the same extent as with cysteine is shown in that no sulphuric acid or appreciable quantities of ammonia could be detected as end products. For this purpose 200 c c of egg white (diluted with equal parts of 0.8 per cent salt solution; protein content = 6 per cent) were placed in each of two 500-c c flasks. The protein was coagulated by immersion into boiling water with stirring, for nine minutes. After cooling the solutions, to one flask was added 33 mg of copper (as chloride) in 50 c c of water, and to the other 33 mg of iron (as chloride) in 50 c c of water. After nine hours'

shaking at 41° C. in an atmosphere of oxygen, only a trace of ammonia could be detected in two 10-c c samples of the solution oxidized with copper, using the iron-containing solution as a control. The remaining 230 c c in each flask were precipitated with equal parts of 20 per cent redistilled trichloracetic acid and the filtrates were tested for sulphuric acid by the addition of hydrochloric acid and barium chloride. Negative results were obtained upon both solutions.

Experiments were done to determine whether the nitroprusside test would disappear before the completion of the oxidation by copper. These tests were done upon some of the coagulated albumin solution in a separate respiration vessel reserved for this purpose. In harmony with the other results it was found that the nitroprusside test became negative early in the course of the oxidation. This is also illustrated

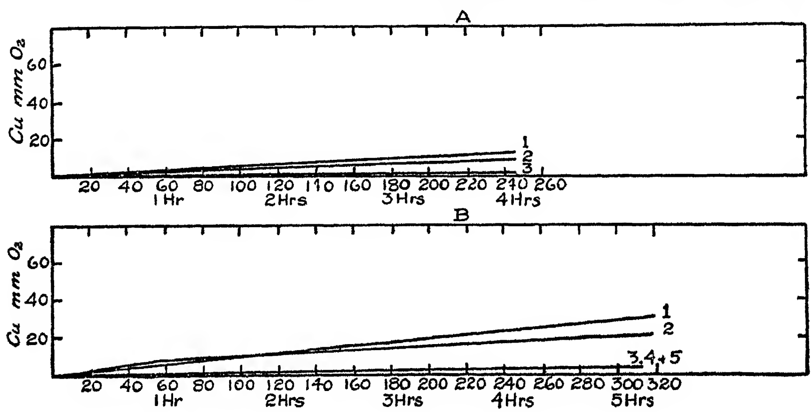

CHART 9.—The ability of manganese to bring about an oxidation of the coagulated albumin, and lack of effect of cobalt, zinc, and tin. A, curve 1, 50 mg albumin + 0.3 mg Cu (as cupric ammonium sulphate), pH 6.8. Curve 2, albumin + 0.3 mg Mn (as $MnSO_4$), pH 7.0. Curve 3, albumin + 0.3 mg Co (as $CoCl_2$), pH 7.8. Experiments run in water, total volume 4.6 c c. B, curve 1, 60 mg albumin + 0.2 mg Cu, pH 6.9. Curve 2, + 0.2 mg Mn, pH 7.4. Curve 3, + 0.2 mg Co, pH 7.2. Curve 4, + 0.2 mg Zn (as $ZnSO_4$), pH 6.9. Curve 5, + 0.1 mg Sn (as $SnCl_2$), pH 7.1. Experiments run in water; total volume 5.4 c c. The nitroprusside tests were positive at the end of all of the above experiments, with the exception of copper.

in Chart 7, where the oxidation was still proceeding rapidly at the end of the experiment, although the nitroprusside test was negative.

Effects of cobalt, zinc, and tin salts on protein sulphydryl groups.—Cobalt has been shown by Michaelis and Barron (9) to form a complex with cysteine, the cobaltous cysteine complex being susceptible of oxidation. Similarly, Voegtlin, Johnson, and Rosenthal (3) found that cobalt and glutathione in the presence of oxygen form a complex which is susceptible of oxidation. However, in three experiments, employing from 0.2 to 0.5 mg of cobalt, no appreciable oxidation could be demonstrated with the coagulated egg albumin. (Chart 9.) With the 0.5 mg addition of cobalt the nitroprusside test at the end of the experiment was less strongly positive than the control, and so it is possible that to some extent a stable cobalt protein complex was formed.

Zinc was found by Voegtlin, Johnson, and Rosenthal (3) to have an inhibitory action on the oxidation of glutathione, while tin in small concentrations was without effect. Large amounts of stannous chloride, under the conditions of these experiments, of themselves take up oxygen due to oxidation to the stannic state. However, when 0.1 mg of stannous chloride was added to 60 mg of coagulated albumin at pH 7.1, no oxygen uptake occurred in five hours, at which time the nitroprusside test on the solution was strongly positive. (Chart 9.)

Zinc was without effect on the coagulated protein. (Chart 9.) Since the protein solution itself does not take up any oxygen, these experiments do not reveal any inhibiting effect that might be shown by tin or zinc upon the oxidation of coagulated albumin.

Effect of manganese on coagulated egg albumin.—It was found by Warburg (4) that manganese could bring about the oxidation of

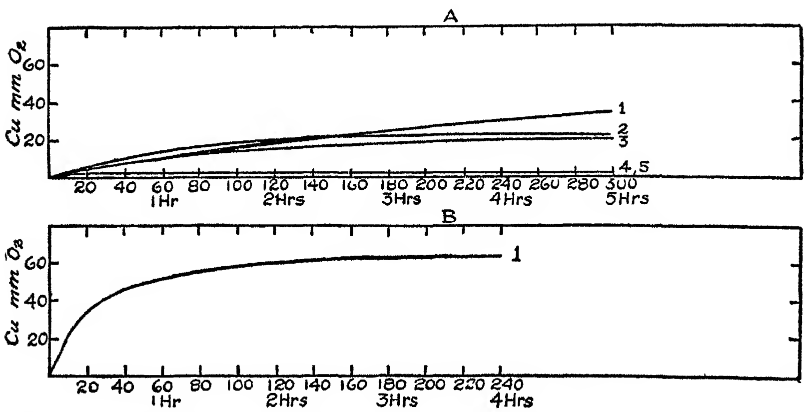

CHART 10.—Effects of manganese ($MnSO_4$) on native and coagulated albumin. A, Curve 1, 52 mg coagulated albumin +0.2 mg Mn, pH 7.1. Curve 2, 47 mg coagulated albumin +0.5 mg Mn, pH 7.0. Curve 3, 47 mg coagulated albumin +0.2 mg Mn, pH 6.8. Curve 4, 47 mg native albumin +0.5 mg Mn, pH 6.9. Curve 5, coagulated albumin alone. Experiments in water, total volume 4.6 c c; Temperature 37.6°C. Atmosphere air. The nitroprusside tests were faintly positive at termination of experiments with curves 1, 2, and 3; B, Curve 1, 76 mg coagulated albumin +0.3 mg of Mn in an atmosphere of oxygen, temperature 41° C., pH 7.6. Aqueous solution, volume 4.6 c c. Nitroprusside test practically negative at end of experiment. Separate determinations revealed no CO_2 formation.

cysteine. In the first half of this paper it was shown that in phosphate buffer at pH 7.5, this oxidation proceeds only to the disulphide state. Voegtlin, Johnson, and Rosenthal (3) found manganese without effect upon the oxidation of glutathione.

Manganese added to native egg albumin at pH 7 to pH 8.4 brought about no oxygen consumption. (Chart 10.) Such experiments also serve as a control to show that the manganous sulphate is not oxidized to manganic compounds under the condition of these experiments.[2] No dark color could be detected in any of the solution at the termination of the experiments.

[2] Such oxidation does occur at pH 10 or above.

Experiments with coagulated albumin showed that manganese could bring about a considerable oxygen uptake. As with copper, this oxidation proceeds more rapidly on the alkaline side of neutrality, but differs in several respects from the oxidation by copper.

In five experiments 0.2 to 0.5 mg of manganese were added to coagulated albumin in aqueous solution, at pH 6.8 to pH 7.4, in an atmosphere of air, and at 37.6° C. The oxygen uptake in five hours was slightly less than with similar amounts of copper; the oxidations had not ceased at the end of this time and the nitroprusside tests were faintly positive at the completion of the experiments. (Charts 9, 10A.)

An experiment was run at 41° C., at pH 7.6, and in an atmosphere of oxygen. Under these conditions 0.3 mg of manganese added to 76 mg of albumin caused an oxygen uptake which had reached completion after 2¼ hours. (Chart 10B.) The total oxygen uptake amounted to 63 cu mm of oxygen, or 0.83 cu mm per milligram of protein. This is less than half the total oxidation caused by copper under the same conditions. Further studies showed that, under these conditions, the oxygen uptake in the presence of manganese was not accompanied by carbon dioxide production.

A third difference between the action of manganese and that of copper is that in the case of manganese the nitroprusside test persists throughout the duration of the oxygen uptake.

The evidence at hand suggests, therefore, that the oxidation by manganese involves only an oxidation of the SH groups. This can not be established with certainty until the actual sulphydryl content of the coagulated albumin and its oxygen requirements can be quantitatively determined.

Oxidation of dialyzed tissues by copper and iron.—It was previously observed (10) that when tissues were dialyzed for two or three days in running water, the glutathione was all washed out, while the residue gave a positive nitroprusside test, as evidence of the presence of protein sulphydryl groups. The technique of the dialysis was similar to that for egg albumin. The rat testis was principally used for the present study. Such a residue at pH 6 to 8 shows a very low consumption of oxygen at 37.6°. When iron was added to the dialyzed testis there was a large uptake of oxygen. Ferric ammonium sulphate was more than seven times as effective as ferric citrate. The oxidation with iron proceeded much more rapidly at an acid reaction. (Charts 11, 12.)

Copper was less effective than iron in causing the oxygen consumption with the dialyzed testis, although an appreciable oxygen uptake occurred. (Chart 11.)

Heating the solution to 100° C. did not diminish the effect of iron and so the possibility seemed remote that the activation of an enzyme was concerned in the oxidation

The depressant effect of hydroxyl ions suggested the oxidation of fats A further experiment proved this to be the case. Some of the dialyzed tissue was precipitated with trichloracetic acid and the residue washed with water until free from acid. The residue was then repeatedly extracted with alcohol and ether The extracts were then combined and the alcohol and ether removed *in vacuo*. The residue of the alcohol-ether extract was taken up in absolute alcohol

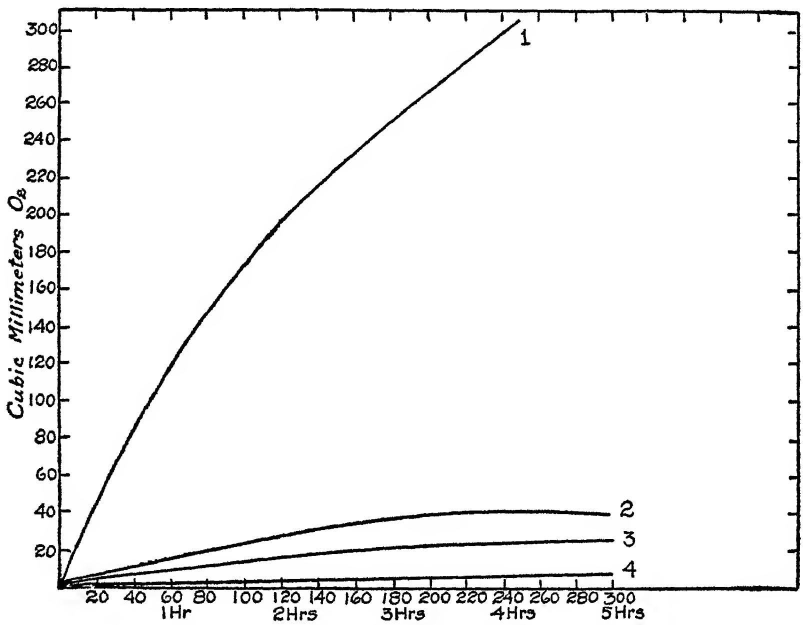

CHART 11.—Oxygen uptake of rat testes dialyzed for 2 days in distilled water at 3° C Effects of iron and copper Curve 1, testes +0 1 mg Fe (ferric ammonium sulphate), pH 6 8 Curve 2, testes +0 1 mg Cu (cupric ammonium sulphate), pH 7 0 Curve 3, testes +0 05 mg Cu, pH 7 0 Curve 4, testes alone, pH 7 2 Fluid volume 2 5 c c, protein content 36 7 mg

and filtered, and the filtrate was evaporated *in vacuo*. An emulsion of the lipoid extract was then made in 0.8 per cent salt solution.

It was found that the emulsion of the alcohol-ether extract took up oxygen upon the addition of iron or copper at pH 6.6 to practically the same extent as the original dialyzed testis, while the testicular residue that was extracted showed no oxygen uptake upon the addition of iron or copper. It can be concluded, therefore, that we are chiefly dealing with an oxidation of the lipoids of the tissue residue by these metals. The disappearance of the nitroprusside reaction, particularly in the case of copper, indicates that a simultaneous oxidation of the protein sulphydryl groups occurs.

DISCUSSION

The ability of copper to oxidize cysteine solutions to carbon dioxide, ammonia, and water is apparently specific for this metal. The fact that copper is without action upon cystine solutions is of particular interest from the point of view of the mechanism of the oxidation, for it demonstrates that a reaction between copper and sulphydryl radical is essential to the process and further suggests that the oxidation does not pass through the cystine stage. In accordance with this view we have also found that taurine in aqueous solution is stable in the presence of copper, while Friedmann (7) has prepared stable copper salts of cysteic acid.

The fact, shown by Voegtlin, Johnson, and Rosenthal (3), that copper can oxidize reduced glutathione only to the disulphide state

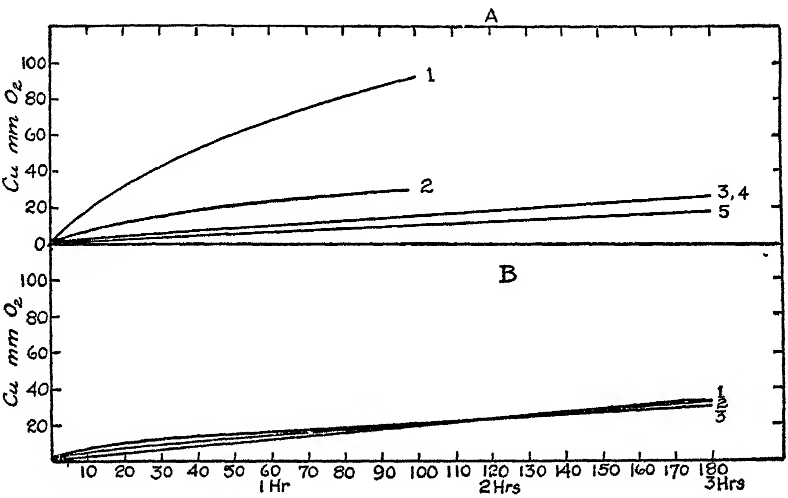

CHART 12.—Effects of iron and copper salts on dialyzed (2 days) rat testes at various hydrogen ion concentrations. A, Curves 1 and 2, testes + 0.1 mg. Fe (ferric ammonium sulphate) at pH 6.7 and 7.6, respectively. Curves 3, 4, and 5, testes + 0.1 mg. Fe (ferric citrate) at pH 6.6, 7.0, and 7.6, respectively. B, Curves 1, 2, and 3, testes + 0.1 mg. Cu (cupric citrate) at pH 6.6, 7.0, and 7.6. Volume of fluid 2.5 c.c.; protein content 20 mg.

is also of physiological interest, for it places this oxidation among the reversible reactions, while the breakdown of the cysteine molecule by copper is irreversible. These observations may be of significance in explaining the fact that cysteine has not been recovered from normal tissues in any appreciable quantities.

The ability of pyrophosphate solutions at pH 7.6 to prevent the oxidation of cysteine by copper beyond the disulphide stage is of interest in that pyrophosphate has been shown by Elvehjem (6) to augment the catalytic action of copper in the oxidation of cysteine to cystine.

The behavior of the coagulated crystalline egg albumin toward heavy metals presents some interesting comparisons. The oxidation

of this protein by copper resembles that of cysteine in that a breakdown of the molecule occurs. This is evidenced by a large excess of oxygen uptake and by the formation of carbon dioxide during the oxidation. The resemblance to cysteine is also shown in that this oxidation does not occur if no free sulphydryl groups are present (as in native albumin). The behavior toward manganese also resembles that of cysteine in that an oxidation is effected (reduced glutathione is not oxidized by manganese) which, from the smaller amount of oxygen consumed, the persistence of the nitroprusside test throughout the oxidation, and the absence of carbon dioxide formation, seems to stop at the disulphide stage. On the other hand, the behavior of the coagulated egg albumin containing SH groups towards iron differs

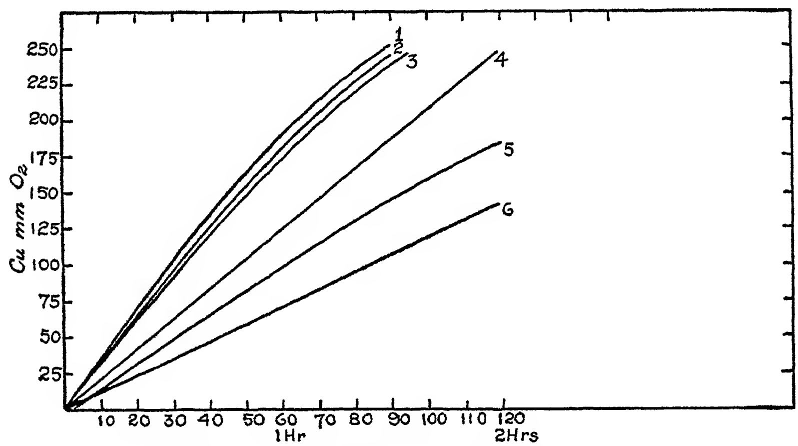

CHART 13.—No acceleration of oxygen uptake from the addition of Cu (citrate) to living rat tissues *in vitro* Curve 1, 0.2 gm liver alone Curves 2 and 3, liver +0.00318 mg Cu (m/50,000) and +0.0318 mg Cu, respectively. Curve 4 represents four curves showing 0.2 gm testes alone, testes +0.0159 mg Cu (m/10,000), testes +0.00318 mg Cu, and testes +0.00159 mg Cu Curve 5, 0.2 gm testes +0.0795 mg Cu (m/2,000) Curve 6 represents four curves showing 0.15 gm Jensen rat sarcoma alone, sarcoma +0.0795 mg Cu, sarcoma +0.0159 mg Cu, and sarcoma +0.00318 mg Cu Tissues in Locke's solution with 0.3 per cent bicarbonate and 0.2 per cent glucose. Total volume 2.5 c c. (Molarity refers to final concentrations)

from cystine and resembles that of glutathione in that no appreciable oxidation is brought about during the course of the experiments.

The oxidations effected by copper and manganese may also involve other portions of the protein molecule as well as the sulphydryl-containing radical, but the absence of effect in the absence of free sulphydryl groups is good evidence that the SH group is essential to the oxidation.

The ability of copper to bring about oxidations in the coagulated egg albumin and of iron and copper to oxidize the fats in dialyzed tissue residues suggests that these metals might stimulate oxidations when added to living cells. However, Rosenthal and Voegtlin (12) were unable to show any increase in oxygen consumption of rat tissues, *in vitro*, or of yeast cells following the addition of various iron

salts in low concentrations, while high concentrations caused a depression of oxygen uptake. We have found similar results with cupric citrate upon rat liver, rat testis, and Jensen rat sarcoma. (Chart 13.) It is possible that iron and copper do bring about such oxidations in living cells, but that these effects are obscured by a simultaneous inhibition of oxygen consumption because of a depression of other phases of cell respiration. These negative results may also be due to lack of penetration of these salts into the interior of the intact cells.

SUMMARY

The addition of copper salts to cysteine in aqueous solution or in phosphate buffer causes an oxidative breakdown of the molecule. This is shown by a consumption of oxygen which can exceed five times the amount necessary for the formation of cystine, by the production of carbon dioxide, ammonia, and sulphuric acid, and by a darkening of the solution during the oxidation. Cysteic acid could not be recovered as an end product.

The addition of copper salts to cystine or taurine solutions is without effect.

The oxidative breakdown of cysteine by copper is completely inhibited in pyrophosphate buffer solutions, the oxidation proceeding only to the cystine stage.

Iron salts and manganese (manganous sulphate) in aqueous solutions or phosphate buffer oxidize cysteine only to cystine.

Copper, iron, or manganese added to solutions of crystalline native egg albumin cause no uptake of oxygen.

When the egg albumin is subjected to heat coagulation to bring out the protein sulphydryl groups, the addition of copper causes an oxidation which also involves an oxidative breakdown in the molecule. This is shown by an oxygen uptake of more than four times the theoretical maximum oxygen consumption attributed to sulphydryl groups, by the production of carbon dioxide, and by the disappearance of the nitroprusside test long before the completion of the oxygen uptake.

The addition of manganese to coagulated egg albumin causes a maximum oxygen consumption of approximately one half that of copper, and is not attended by the formation of carbon dioxide. The nitroprusside test persists throughout the oxidation.

The addition of iron, cobalt, tin, or zinc to coagulated egg albumin causes no appreciable uptake of oxygen.

The addition of iron or copper salts to dialyzed tissues brings about an oxygen consumption which is largely concerned with the oxidation of fats.

As has been shown with iron salts, the addition of cupric citrate to rat tissues and Jensen rat sarcoma in low concentrations does not alter the oxygen consumption. Higher concentrations cause some inhibition of oxygen uptake. Under these circumstances stimulation of oxidations may be obscured by depression of other phases of cell respiration.

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COURT DECISION RELATING TO PUBLIC HEALTH

County required to pay specified monthly sum for maintenance in State narcotic hospital of addict who is resident of such county.—(California District Court of Appeal, First Dist., Div. 2; Riley *v.* Stack et al., 18 P. (2d) 110; decided Dec. 29, 1932.) The narcotic rehabilitation act authorized the superior court to commit drug addicts to the State narcotic hospital and provided, among other things, that the county of which an addict was a bona fide resident should pay the State at the rate of $25 per month for the time such committed addict remained an inmate of the institution. By order of the superior court sitting in the city and county of San Francisco, a certain addict was duly and regularly committed to the State narcotic hospital. The court found the addict to be a resident of San Mateo County and ordered that county to make payments to the State for the support of the addict pursuant to the statute. In a mandamus proceeding to require the auditor and treasurer of San Mateo County to comply with the act, the respondents defended upon the ground that San Mateo County was not a party to the proceeding leading to the commitment and had no opportunity to contest the issue of the residence of the addict. They argued that the due process clauses of the Federal and State Constitutions, guaranteeing that no *person* should be deprived of his property without due process of law, required that the county or its taxpayers

should be heard before an obligation to pay was placed upon them. The appellate court rejected this view and granted the writ prayed for. It concluded its opinion with the following language:

Our conclusion is that the act does not offend the due process clause in so far as the county is concerned, because the county is not a "person" within the meaning of either the Federal or the State Constitution but is a mere subdivision of the State, and, in so far as the individual taxpayer of the county is concerned, his property is not taken without due process, because when the legislature itself fixes the taxing district (i. e., the county) it is presumed to have taken such evidence upon the question of benefits to the local taxpayer as may be necessary and its determination of that matter is conclusive. [Cases cited.] The right which the taxpayer then has is not a right to question the public necessity for the tax which he is to pay. Id. This right is preserved in the general tax laws, but it is not necessary to make specific references to these provisions, because no taxpayer of San Mateo County is proceeding under them.

DEATHS DURING WEEK ENDED MARCH 18, 1933

[From the Weekly Health Index issued by the Bureau of the Census, Department of Commerce]

	Week ended Mar. 18, 1933	Corresponding week, 1932
Data from 85 large cities of the United States:		
Total deaths	8,609	9,769
Deaths per 1,000 population, annual basis	12.1	13.9
Deaths under 1 year of age	641	720
Deaths under 1 year of age per 1,000 estimated live births [1]	55	60
Deaths per 1,000 population, annual basis, first 11 weeks of year	12.4	12.5
Data from industrial insurance companies		
Policies in force	68,819,116	73,791,756
Number of death claims	13,721	16,289
Death claims per 1,000 policies in force, annual rate	10.4	11.5
Death claims per 1,000 policies, first 11 weeks of year, annual rate	11.2	10.2

[1] 1933, 81 cities; 1932, 80 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended March 25, 1933, and March 26, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended March 25, 1933, and March 26, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Mar. 25, 1933	Week ended Mar. 26, 1932	Week ended Mar. 25, 1933	Week ended Mar. 26, 1932	Week ended Mar. 25, 1933	Week ended Mar. 26, 1932	Week ended Mar. 25, 1933	Week ended Mar. 26, 1932
New England States:								
Maine	1	3	2	16		286	0	0
New Hampshire			1			8	0	0
Vermont		2			44	70	0	0
Massachusetts	17	42	5	16	375	514	1	4
Rhode Island	2	11	1			254	0	0
Connecticut	6	7	19	38	240	154	1	1
Middle Atlantic States:								
New York	76	116	[1] 36	[1] 97	3,903	2,255	3	5
New Jersey	22	32	9	164	1,716	339	1	0
Pennsylvania	73	84			1,176	1,681	6	3
East North Central States:								
Ohio	40	40	10	91	629	618	0	6
Indiana	24	21	90	186	112	72	10	12
Illinois	48	82	32	145	398	365	29	3
Michigan	18	27	12	71	823	906	3	6
Wisconsin	7	13	64	505	390	570	0	1
West North Central States:								
Minnesota	27	6	2	5	1,323	20	2	3
Iowa	11	8			5	4	0	1
Missouri	30	23	22	55	250	45	1	1
North Dakota	9	1			21	55	4	1
South Dakota	4	2	1		3	9	0	0
Nebraska	13	6	2		27	8	0	1
Kansas	5	15	3	22	309	128	1	1
South Atlantic States:								
Delaware	1	8			7	3	0	0
Maryland [2]	8	12	24	318	12	25	0	1
District of Columbia	3	7	1	11	5	2	1	2
Virginia	13				490		2	
West Virginia	14	17	12	284	276	438	0	1
North Carolina	17	17	64	169	509	670	0	2
South Carolina	7	6	751	1,909	171	111	0	0
Georgia [4]	8	15	319	125	64	25	1	1
Florida [3]	5	6	10		57	3	0	0
East South Central States:								
Kentucky	6	25	53	790	130	118	0	0
Tennessee	9	3	105	1,137	53	174	2	1
Alabama [3]	14	10	121	123	15	12	2	1
Mississippi	5	7					4	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended March 25, 1933, and March 26, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Mar. 25, 1933	Week ended Mar. 26, 1932	Week ended Mar. 25, 1933	Week ended Mar. 26, 1932	Week ended Mar. 25, 1933	Week ended Mar. 26, 1932	Week ended Mar. 25, 1933	Week ended Mar. 26, 1932
West South Central States:								
Arkansas	9	3	48	308	152	5	3	0
Louisiana	17	17	33	60	31	219	1	0
Oklahoma [4]	9	24	56	531	77	21	2	1
Texas [5]	132	49	117	33	1,180	25	1	0
Mountain States:								
Montana				41	57	113	1	1
Idaho		1	5	2	32		0	0
Wyoming	1				4	4	0	0
Colorado	1		31		11	183	0	0
New Mexico	11	10		2	10	92	2	0
Arizona	3	4	1	21	33	1	0	0
Utah [3]	3	1	3		2	1	0	1
Pacific States:								
Washington	9	1	3	9	37	619	1	1
Oregon		2	42	170	61	219	0	0
California [3]	55	64	50	113	1,378	431	7	4
Total	790	853	2,190	7,609	16,604	11,918	92	66

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Mar. 25, 1933	Week ended Mar. 26, 1932	Week ended Mar. 25, 1933	Week ended Mar. 26, 1932	Week ended Mar. 25, 1933	Week ended Mar. 26, 1932	Week ended Mar. 25, 1933	Week ended Mar. 26, 1932
New England States:								
Maine	0	0	8	33	0	0	1	0
New Hampshire	0	0	25	46	0	0	0	0
Vermont	1	0	26	10	0	4	0	0
Massachusetts	0	0	456	586	0	0	4	2
Rhode Island	0	0	31	78	0	0	0	2
Connecticut	0	0	147	91	0	2	0	0
Middle Atlantic States:								
New York	3	2	1,110	1,780	0	3	11	7
New Jersey	0	1	351	345	0	0	6	4
Pennsylvania	1	1	1,069	524	0	0	8	10
East North Central States:								
Ohio	0	0	635	302	23	21	3	1
Indiana	0	0	175	151	6	10	2	0
Illinois	1	1	535	433	16	13	2	14
Michigan	0	0	603	459	2	6	5	2
Wisconsin	1	0	154	95	2	0	1	1
West North Central States:								
Minnesota	0	1	109	103	0	1	0	0
Iowa	0	0	51	56	42	26	0	1
Missouri	1	0	78	72	21	4	5	2
North Dakota	0	0	15	13	0	6	1	0
South Dakota	0	2	19	4	0	8	1	1
Nebraska	0	0	42	37	3	14	0	0
Kansas	0	0	65	56	1	4	4	6
South Atlantic States:								
Delaware	0	0	12	26	0	0	1	0
Maryland [2]	0	0	110	136	0	0	1	0
District of Columbia	0	0	15	20	0	0	0	0
Virginia	0	1	63		0		5	
West Virginia	1	0	31	26	1	17	8	7
North Carolina	0	0	51	63	1	2	2	8
South Carolina	0	3	3	9	0	1	5	19
Georgia [3]	0	0	7	5	3	0	3	1
Florida [3]	0	0	7	5	0	0	18	23
East South Central States:								
Kentucky	0	0	64	82	0	8	6	6
Tennessee	1	0	41	18	2	17	8	10
Alabama [3]	1	0	13	18	14	5	2	3
Mississippi	0	0	3	18	0	8	10	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended March 25, 1933, and March 26, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Mar. 25, 1933	Week ended Mar. 26, 1932	Week ended Mar. 25, 1933	Week ended Mar. 26, 1932	Week ended Mar. 25, 1933	Week ended Mar. 26, 1932	Week ended Mar. 25, 1933	Week ended Mar. 26, 1932
West South Central States:								
Arkansas	0	0	8	12	15	8	3	1
Louisiana	0	0	11	6	0	5	7	12
Oklahoma [4]	0	0	15	35	7	16	1	0
Texas [3]	1	0	37	36	8	32	12	4
Mountain States:								
Montana	0	1	10	37	0	0	5	1
Idaho	0	0	7	0	6	0	1	4
Wyoming	0	0	8	8	0	0	1	2
Colorado	0	0	11	35	0	1	1	1
New Mexico	1	0	17	9	0	0	1	0
Arizona	0	0	23	6	0	0	0	3
Utah [2]	0	0	6	6	0	0	0	1
Pacific States:								
Washington	0	0	61	34	8	29	0	2
Oregon	0	0	29	12	2	23	3	2
California [3]	3	0	176	135	48	23	5	8
Total	16	13	6,519	6,0[illegible]0	231	317	163	171

[1] New York City only.
[2] Week ended Friday.
[3] Typhus fever, week ended Mar. 25, 1933, 7 cases: 1 case in Georgia, 2 cases in Florida, 2 cases in Alabama, 1 case in Texas, and 1 case in California.
[4] Figures for 1933 are exclusive of Oklahoma City and Tulsa and for 1932 are exclusive of Tulsa only.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
January, 1933										
Hawaii Territory		9	142				1		0	8
Washington	2	44	206		14		1	142	53	15
February, 1933										
California	10	213	759	1	1,873		4	879	145	29
Georgia	4	44	2,111	203	116	17	0	47	0	17
Illinois	66	197	303	1	883	1	3	1,742	33	21
Iowa	6	45			20		0	175	160	2
Maryland	2	45	513		21	1	0	394	0	12
Minnesota	10	24	8		4,197		1	385	1	10
North Carolina	11	76	1,104		1,578	75	1	144	4	15
Ohio	3	168	499	1	2,453		0	2,580	29	16
Oregon		14	383		401		0	88	9	5
Rhode Island		13	63		4		0	149	0	0
South Carolina		134	7,671	438	318	139	1	14	0	4
South Dakota	2	16	42		51		0	67	7	3
West Virginia	3	61	843		1,696		4	124	0	21

January, 1933

	Cases
Chicken pox:	
Hawaii Territory	28
Washington	561
Conjunctivitis, epidemic:	
Hawaii Territory	5
Conjunctivitis, follicular:	
Hawaii Territory	24
Dysentery:	
Washington	1
German measles:	
Washington	9
Hookworm disease:	
Hawaii Territory	63
Impetigo contagiosa:	
Hawaii Territory	1
Washington	1
Leprosy:	
Hawaii Territory	6
Lethargic encephalitis:	
Washington	1
Mumps:	
Hawaii Territory	4
Washington	92
Plague:	
Hawaii Territory	1
Rabies in animals:	
Washington	1
Scabies:	
Washington	9
Septic sore throat:	
Washington	1
Tetanus:	
Hawaii Territory	2
Trachoma:	
Hawaii Territory	1
Undulant fever:	
Washington	2
Whooping cough:	
Hawaii Territory	28
Washington	51

February, 1933

	Cases
Actinomycosis:	
California	1
Illinois	1
Botulism:	
California	2
Chicken pox:	
California	2,687
Georgia	154
Illinois	1,938
Iowa	161
Maryland	485
Minnesota	452
North Carolina	547
Ohio	2,282
Oregon	199
Rhode Island	19
South Carolina	155
South Dakota	68
West Virginia	225
Conjunctivitis:	
Illinois	1
Dengue:	
South Carolina	3
Diarrhea:	
South Carolina	315
Diarrhea and enteritis:	
Ohio (under 2 years)	17
Dysentery:	
California (amebic)	5
California (bacillary)	14
Georgia	17
Illinois (amebic)	1
Maryland	3
Minnesota (amebic)	3
Ohio	1
Food poisoning:	
California	28
Ohio	16
German measles:	
California	36
Illinois	41
Iowa	5
Maryland	15
North Carolina	11
Ohio	34
Rhode Island	1
South Carolina	5
Granuloma, coccidioidal:	
California	3
Hookworm disease:	
South Carolina	124
Impetigo contagiosa:	
Iowa	2
Maryland	16
Oregon	43
Lead poisoning:	
Illinois	12
Ohio	9
Lethargic encephalitis:	
California	3
Georgia	1
Illinois	2
Iowa	2
Minnesota	1
Ohio	1
Oregon	1
South Carolina	6
Mumps:	
California	873
Georgia	105
Illinois	236
Iowa	190
Maryland	404
Ohio	227
Oregon	10
Rhode Island	16
South Carolina	55
South Dakota	22
West Virginia	12
Opthalmia neonatorum:	
Illinois	7
Minnesota	1
North Carolina	1
Ohio	86
South Carolina	15
South Dakota	1
Paratyphoid fever:	
California	3
Ohio	1
Puerperal septicemia:	
Illinois	6
South Dakota	1
Rabies in animals:	
California	40
Illinois	27
Maryland	2
South Carolina	22
Rabies in man:	
Illinois	1
Rat-bite fever:	
Maryland	1
Scabies:	
Maryland	6
Oregon	58
Septic sore throat:	
California	11
Georgia	23
Illinois	10
Maryland	5
North Carolina	9
Ohio	316
Oregon	8
Rhode Island	1
South Dakota	3
Tetanus:	
California	4
Illinois	1
Maryland	2
Ohio	3
South Carolina	1
Trachoma:	
California	15
Illinois	1
Ohio	3
Trichinosis:	
California	1
Illinois	1
Tularaemia:	
California	1
Georgia	4
Illinois	7
Maryland	1
North Carolina	8
Ohio	2
South Carolina	1
Typhus fever:	
California	1
Georgia	19
Illinois	1
Undulant fever:	
California	8
Georgia	1
Illinois	10
Iowa	6
Maryland	2
Minnesota	1
North Carolina	3
Ohio	2
Oregon	1
Rhode Island	1
South Dakota	1
Vincent's angina:	
Illinois	44
Iowa	2
Maryland	8
Oregon	7
Whooping cough:	
California	1,121
Georgia	159
Illinois	278
Iowa	42
Maryland	119
Minnesota	383
North Carolina	601
Ohio	502
Oregon	53
Rhode Island	54
South Carolina	124
South Dakota	4
West Virginia	118

WEEKLY REPORTS FROM CITIES

City reports for week ended March 18, 1933

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	0	----	1	2	3	2	0	0	0	13	28
New Hampshire:											
Concord	0	----	0	0	1	0	0	0	0	0	11
Manchester	0	----	0	0	2	8	0	0	0	0	7
Nashua	0	----	0	0	0	0	0	0	0	0	----
Vermont:											
Barre	0	----	0	0	0	0	0	0	0	5	1
Burlington	1	----	0	0	0	3	0	0	0	0	5
Massachusetts:											
Boston	3	1	0	70	27	99	0	9	0	71	223
Fall River	1	----	0	0	5	9	0	1	0	9	41
Springfield	0	----	0	0	2	10	0	0	0	31	30
Worcester	0	----	0	3	5	33	0	2	0	5	0
Rhode Island:											
Pawtucket	0	----	0	0	0	0	0	0	0	0	8
Providence	2	2	2	0	10	20	0	2	0	14	70
Connecticut:											
Bridgeport	0	3	0	18	0	11	0	2	0	3	35
Hartford	0	----	0	9	8	10	0	2	0	3	60
New Haven	0	----	0	0	4	8	0	0	0	16	51
New York:											
Buffalo	7	----	7	12	28	74	0	11	0	23	175
New York	36	21	9	2,108	192	402	0	96	6	145	1,565
Rochester	0	----	0	1	2	24	0	2	0	22	73
Syracuse	0	----	0	1	2	47	0	0	0	10	46
New Jersey:											
Camden	0	----	0	0	1	13	0	0	0	0	28
Newark	0	6	0	589	14	32	0	6	1	23	112
Trenton	4	----	1	16	5	27	0	2	0	0	38
Pennsylvania:											
Philadelphia	5	8	4	97	61	142	0	39	2	5	542
Pittsburgh	10	4	3	4	16	76	0	9	1	18	153
Reading	2	----	0	77	6	11	0	0	0	7	28
Ohio:											
Cincinnati	1	----	4	1	16	36	0	7	0	1	128
Cleveland	10	78	2	1	15	206	0	15	0	40	217
Columbus	1	2	2	68	2	10	0	5	0	0	99
Toledo	2	2	1	208	3	84	0	5	0	5	57
Indiana:											
Fort Wayne	4	----	0	0	2	3	0	0	0	0	15
Indianapolis	3	----	1	110	12	32	0	3	0	17	----
South Bend	0	----	0	0	1	0	0	1	0	2	22
Terre Haute	1	----	0	0	2	10	0	1	0	0	20
Illinois:											
Chicago	2	13	10	320	80	283	1	42	0	23	750
Springfield	0	1	0	2	3	4	0	0	0	0	23
Michigan:											
Detroit	16	6	1	654	24	233	0	16	1	101	255
Flint	1	5	0	82	7	4	0	3	0	7	39
Grand Rapids	0	----	2	2	5	5	0	2	0	35	39
Wisconsin:											
Kenosha	0	----	0	0	0	7	0	0	0	11	3
Madison	1	----	----	125	----	7	0	----	0	1	----
Milwaukee	0	----	0	4	4	43	0	6	0	52	94
Racine	1	----	0	0	0	9	0	1	0	2	16
Superior	0	----	0	0	1	0	0	0	0	19	18
Minnesota:											
Duluth	0	----	0	5	0	1	0	2	0	44	20
Minneapolis	1	----	1	567	8	31	0	0	0	17	107
St. Paul	----	----	----	----	----	----	----	----	----	----	----
Iowa:											
Des Moines	4	----	----	0	----	5	0	----	0	0	35
Sioux City	0	----	----	2	----	4	0	----	0	0	----
Waterloo	1	----	----	0	----	4	2	----	0	0	----
Missouri:											
Kansas City	2	----	1	182	15	40	0	4	0	0	131
St. Joseph	0	----	0	33	3	2	0	0	0	6	17
St. Louis	15	----	----	17	6	20	0	11	1	1	226
North Dakota:											
Fargo	0	----	0	0	1	1	0	0	0	0	2
Grand Forks	0	----	0	0	0	0	0	0	0	0	----
South Dakota:											
Aberdeen	0	----	0	0	0	2	0	0	0	0	----

City reports for week ended March 18, 1933—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Nebraska:											
Omaha	6	------	0	3	9	8	0	0	0	0	64
Kansas:											
Topeka	0	------	1	131	3	0	0	1	0	0	17
Wichita	0	------	0	0	3	1	0	1	1	3	36
Delaware:											
Wilmington	2	------	0	3	12	5	0	0	0	2	38
Maryland:											
Baltimore	5	10	6	2	39	70	0	15	0	18	244
Cumberland	0	1	0	0	0	1	0	0	0	0	13
Frederick	0	------	0	0	0	0	0	0	0	0	4
Dist. of Columbia:											
Washington	3	3	1	3	14	28	0	13	1	6	148
Virginia:											
Lynchburg	0	------	0	1	0	2	0	0	0	1	16
Norfolk	0	------	0	2	5	4	0	1	1	0	31
Richmond	0	------	4	1	5	4	0	3	0	4	48
Roanoke	0	------	0	160	0	3	0	0	0	0	14
West Virginia:											
Charleston	0	------	0	0	0	3	0	1	1	1	4
Huntington	0	------	0	9	0	1	0	0	0	0	------
Wheeling	0	------	0	16	4	1	0	1	0	3	25
North Carolina:											
Raleigh	0	------	0	0	2	0	0	0	0	0	17
Wilmington	0	------	0	157	0	1	0	1	0	0	15
Winston-Salem	0	2	1	4	3	7	0	1	0	5	22
South Carolina:											
Charleston	0	14	2	1	2	1	0	3	0	3	20
Columbia	0	------	0	0	2	0	0	0	0	0	8
Georgia:											
Atlanta	0	52	2	2	6	2	0	3	0	17	83
Brunswick	0	-	0	0	0	0	0	0	0	0	2
Savannah	1	168	1	0	2	0	0	0	0	0	20
Florida:											
Miami	1	2	0	0	2	0	0	0	1	35	24
Tampa	0	2	2	0	2	1	0	2	4	1	18
Kentucky:											
Ashland	0	------	0	7	0	0	0	0	1	0	------
Lexington	0	5	0	5	3	0	0	------	0	0	15
Tennessee:											
Memphis	4	------	3	8	8	7	0	3	1	10	74
Nashville	0	------	1	0	1	1	0	2	1	0	41
Alabama:											
Birmingham	1	7	4	3	12	2	0	5	2	17	87
Mobile	0	------	0	1	4	1	0	1	0	0	16
Montgomery	1	3	------	0	------	0	0	------	0	0	------
Arkansas:											
Fort Smith	0	------	------	1	------	0	0	------	0	0	------
Little Rock	0	------	1	3	5	0	0	1	0	0	8
Louisiana:											
New Orleans	6	3	3	3	14	7	0	9	2	4	148
Shreveport	0	------	0	0	4	0	0	2	0	0	21
Oklahoma:											
Tulsa	1	-	------	22	------	2	1	------	0	1	------
Texas:											
Dallas	9	2	2	-	5	0	0	6	1	0	58
Fort Worth	1	------	0	330	9	4	0	2	0	0	40
Galveston	1	------	0	3	4	0	0	1	1	0	12
Houston	11	------	0	29	10	2	0	2	0	0	79
San Antonio	2	------	4	24	7	2	0	7	0	0	77
Montana:											
Billings	0	------	0	0	0	0	0	0	0	0	4
Great Falls	0	------	0	1	0	0	0	1	0	0	6
Helena	1	------	0	0	0	0	0	0	0	0	5
Missoula	0	------	0	2	1	0	0	1	0	0	3
Idaho:											
Boise	0	------	0	29	0	0	1	0	0	1	4
Colorado:											
Denver	2	43	3	4	13	24	0	1	0	2	70
Pueblo	0	------	1	0	0	4	0	1	0	3	9
New Mexico:											
Albuquerque	0	------	0	0	2	0	0	3	0	2	9
Arizona:											
Phoenix	0	------	0	4	0	4	3	3	0	0	------

City reports for week ended March 18, 1933—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Utah:											
Salt Lake City	0	-------	0	1	1	7	0	1	0	6	31
Nevada:											
Reno	0	-------	0	0	1	0	0	0	0	0	2
Washington:											
Seattle	0	-------	-------	3	-------	7	0	-------	0	1	-------
Spokane	0	-------	-------	0	-------	1	0	-------	0	0	-------
Tacoma	0	-------	1	0	3	1	0	-------	0	0	21
Oregon:											
Portland	0	-------	1	3	4	4	2	2	0	3	68
Salem	1	2	-------	22	-------	0	0	-------	0	0	-------
California:											
Los Angeles	31	26	0	508	14	55	13	20	3	26	277
Sacramento	0	3	0	1	5	0	0	5	0	18	32
San Francisco	2	4	0	6	6	8	0	9	2	78	134

State and city	Meningococcus meningitis Cases	Meningococcus meningitis Deaths	Poliomyelitis cases	State and city	Meningococcus meningitis Cases	Meningococcus meningitis Deaths	Poliomyelitis cases
New York:				West Virginia:			
New York	1	1	1	Wheeling	0	0	1
Pennsylvania:							
Philadelphia	2	1	1	Tennessee			
Pittsburgh	2	1	1	Memphis	1	0	0
Indiana:				Louisiana			
Indianapolis	7	4	0	New Orleans	5	0	0
Illinois:							
Chicago	20	4	0	Colorado:			
Springfield	0	1	0	Denver	0	1	0
Michigan:							
Detroit	2	0	0	California:			
Grand Rapids	1	0	0	Los Angeles	0	1	0
Missouri:							
Kansas City	3	0	0				
St. Joseph	7	0	0				
St. Louis	2	0	0				

Lethargic encephalitis.—Cases: New York, 3.
Pellagra.—Cases: Winston-Salem, 1; Savannah, 3; Miami, 2; Dallas, 2; Los Angeles, 1.
Typhus fever.—Cases: Charleston, S. C., 1; Tampa, 2; Houston, 1.

FOREIGN AND INSULAR

CANADA

Quebec Province—Communicable diseases—Four weeks ended February 25, 1933.—The Bureau of Health of the Province of Quebec, Canada, reports cases of certain communicable diseases for the four weeks ended February 25, 1933, as follows:

Disease	Weeks ended		Two weeks ended Feb. 25
	Feb. 4	Feb. 11	
Cerebrospinal meningitis	1		
Chicken pox	169	132	354
Diphtheria	22	33	39
Erysipelas	8	5	11
German measles	4	4	8
Influenza	12	2	6
Measles	100	90	303
Poliomyelitis	1	2	5
Puerperal septicemia	1		3
Scarlet fever	99	65	191
Tuberculosis	96	90	159
Typhoid fever	24	24	20
Whooping cough	139	188	204

CUBA

Provinces—Communicable diseases—Four weeks ended February 4, 1933.—During the four weeks ended February 4, 1933, cases of certain communicable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana	Matanzas	Santa Clara	Camaguey	Oriente	Total
Chicken pox	2	2				2	6
Diphtheria	1	20			2		23
Leprosy		2		3			5
Malaria	2	20	67	158	68	139	754
Measles	1	3	6	64	1	13	88
Rabies		1					1
Scarlet fever	1						1
Tetanus, infantile			1			1	2
Tuberculosis	2	22	5	5	4	5	43
Typhoid fever		11	1	11	1	5	29

GREAT BRITAIN

England and Wales—Vital statistics—October–December, 1932.—During the fourth quarter of the year 1932, 140,350 births and 116,458 deaths were registered in England and Wales. The following statistics are taken from the Quarterly Return of Births, Deaths, and Marriages, issued by the Registrar-General of England and Wales. The figures are provisional.

Birth and death rates in England and Wales, October to December, 1932

Annual rates per 1,000 population:	
Live births	13.9
Stillbirths	.61
Deaths, all causes	11.5
Deaths from—	
Diphtheria	.06
Influenza	.18
Measles	.03
Annual rates per 1,000 population—Cont'd.	
Deaths from—Continued	
Scarlet fever	0.01
Typhoid and paratyphoid fever	.01
Violence	.53
Whooping cough	.04
Deaths per 1,000 live births:	
Diarrhea and enteritis (under 2 years)	7.5
Total deaths under 1 year	61.0

England and Wales—Infectious diseases—Thirteen weeks ended December 31, 1932.—During the 13 weeks ended December 31, 1932, cases of certain infectious diseases were reported in England and Wales as follows:

Disease	Cases	Disease	Cases
Diphtheria	12,807	Puerperal pyrexia	1,298
Ophthalmia neonatorum	1,004	Scarlet fever	28,496
Pneumonia	14,379	Smallpox	271
Puerperal fever	481	Typhoid fever	906

PUERTO RICO

Mortality from communicable diseases—Years 1931 and 1932.—The following table shows the number of deaths and death rates per 100,000 population from communicable diseases in Puerto Rico during the years 1931 and 1932.

Cause of death	1931		1932	
	Number of deaths	Death rate per 100,000 population	Number of deaths	Death rate per 100,000 population
All transmissible causes	9,293	590.2	9,580	599.1
Diphtheria	61	3.9	47	2.9
Dysentery	117	7.4	138	8.6
Influenza	246	15.6	449	28.1
Malaria	3,208	203.7	2,797	174.9
Measles	6	.4	51	3.2
Syphilis	341	21.6	413	25.8
Tetanus	426	27.1	447	28.0
Tuberculosis	4,338	275.5	4,753	297.3
Typhoid and paratyphoid fever	101	6.6	82	5.1
Whooping cough	181	11.5	131	8.2
All other transmissible causes	265	16.8	272	17.0

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

(NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for March 31, 1933, pp. 331-345. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued April 28, 1933, and thereafter, at least for the time being, in the issue published on the last Friday of each month.)

Cholera

Philippine Islands.—During the week ended March 25, 1933, one fatal case of cholera was reported at Ormoc, Leyte Province, Philippine Islands.

Plague

Java—Batavia.—During the week ended March 18, 1933, an imported case of plague was reported at Batavia, Java.

Yellow Fever

Senegal.—On March 17, 1933, a fatal case of yellow fever was reported at Dagana, Senegal, and on March 20 a case was reported at Podor, Senegal.

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UNITED STATES PUBLIC HEALTH SERVICE

HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst. Surg. Gen. R. C. WILLIAMS, *Chief of Division*

The PUBLIC HEALTH REPORTS are issued weekly by the United States Public Health Service through its Division of Sanitary Reports and Statistics, pursuant to acts of Congress approved February 15, 1893, and August 14, 1912.

They contain: (1) Current information of the prevalence and geographic distribution of preventable diseases in the United States in so far as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other communicable diseases throughout the world. (2) Articles relating to the cause, prevention, or control of disease. (3) Other pertinent information regarding sanitation and the conservation of public health.

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PUBLIC HEALTH REPORTS

VOL. 48 APRIL 14, 1933 No. 15

CURRENT PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES[a]

February 26–March 25, 1933

The prevalence of certain important communicable diseases, as indicated by weekly telegraphic reports from State health departments to the United States Public Health Service, is summarized in this report. The underlying statistical data are published weekly in the PUBLIC HEALTH REPORTS, under the section entitled "Prevalence of Disease."

Meningococcus meningitis—The number of cases of meningitis (393) reported for the current 4-week period was 1.3 times that reported for the corresponding period last year. The number was, however, approximately 300 and 800 less than was reported for the same period in 1931 and 1930, respectively. Each geographic area except the Middle and South Atlantic areas reported appreciable increases. The greatest increases were shown in States in the North and South Central regions and the Mountain region. Illinois reported 92 cases for the current period as compared with 21 last year, Missouri 31 as against 3 last year, and Colorado 17 as compared with 2 last year. With the exception of Kentucky, all States in the South Central areas reported increases. The number of cases (60) reported from those areas was twice the number reported for this period last year.

Smallpox.—Smallpox maintained the relatively low level of the preceding 4-week period. For the entire reporting area there were 810 cases, as compared with 1,413, 3,750, and 6,502 for the corresponding period in the years 1932, 1931, and 1930, respectively. The South Atlantic and Mountain and Pacific areas reported slight increases over last year, but the incidence was still considerably below that of the preceding years. In other areas the current incidence was the lowest in the five years for which data are available.

Poliomyelitis.—The reported incidence of poliomyelitis (50 cases) was practically the same as that for the preceding 4-week period, and was the lowest for this period in the five (preceding) years for

[a] From the Office of Statistical Investigations, U S Public Health Service The numbers of States included for the various diseases are as follows Typhoid fever, 48, poliomyelitis, 48, meningococcus meningitis, 48, smallpox, 48, measles, 48, diphtheria, 48, scarlet fever, 48, influenza, 38 States and New York City. The District of Columbia is counted as a State in these reports.

which data are available. While in some geographic areas the incidence for the current period was slightly higher than that for the corresponding period last year, the numbers of cases were not large, and in general the situation was very favorable in all areas.

Diphtheria.—In comparison with recent years the incidence of diphtheria continued very low. For the current period the number of cases (2,886) was only about 75 per cent of that reported for the corresponding period in the years 1932 and 1931. For this period in 1930 the number of cases was 5,350. Each geographic area shares in the favorable situation at the present time.

Typhoid fever.—The number of cases of typhoid fever reported for the current 4-week period was 545, as compared with 693, 475, and 734 for the corresponding period in the years 1932, 1931, and 1930, respectively. Each geographic area, except the Mountain, either approximated last year's incidence for the same period or showed an appreciable decrease. Due to an increase in Montana from 5 cases for this period last year to 26 for the current period, the number of cases (45) for the whole Mountain area represented an increase of almost 100 per cent over last year's figure.

Scarlet fever.—The current period showed a slight increase in scarlet fever over the corresponding period in each of the four preceding years. For the four weeks ended March 25 the number of cases totaled 26,549. The disease seemed to be most prevalent in the East North Central and Mountain and Pacific areas. While the relative increase was not large, the 9,000 cases reported from the East North Central States was the highest for this period in five years, and the 1,500 reported from the Mountain and Pacific areas was the highest since 1930.

Measles.—All sections of the country showed a continued seasonal increase of measles during the current 4-week period. The number of cases reported (62,153) was 1.3 times that for the corresponding period last year. For this period in 1931 and 1930 there were 69,621 and 53,110 cases, respectively. The disease was most prevalent in the West North Central and South Central groups of States. The number of cases (7,870) reported from the West North Central groups was more than five times the number for last year; the South Central groups reported 4,716 cases for the current period, as against 1,652 last year. Other areas closely approximated last year's incidence. The Mountain and Pacific reported 25 and 10 per cent decreases, respectively.

Influenza.—For the first time since early in 1932 the influenza incidence fell below that of a corresponding 4-week period of the preceding year. For the current period 10,329 cases were reported, as against 36,368, 25,635, and 8,474 for the corresponding period in the years 1932, 1931, and 1930, respectively. At this time in 1932 there

was a considerable excess of cases, and slightly earlier in 1931 there was a minor epidemic. The 1930 figure, however, is free from any epidemic tendency and the incidence for the current period approached the 1930 level in all areas.

Mortality, all causes.—The average mortality rate from all causes in large cities, as reported by the Bureau of the Census for the four weeks ended March 25 was 11.8 per thousand population (annual basis). For this period in the years 1932, 1931, and 1930 the rate was 13.5, 13.7, and 13.5, respectively. The current rate is the lowest in the eight years for which data are available.

EXPERIMENTAL STUDIES OF WATER PURIFICATION

VI. General Summary and Conclusions

By H. W. Streeter, *Sanitary Engineer, United States Public Health Service*

INTRODUCTORY

Previous reports of this series [1] have dealt with the methods and results of certain experiments which were undertaken by the Public Health Service in 1924, at a fully equipped experimental water-filtration plant located at Cincinnati, Ohio. The primary object was to verify, under conditions subject to adjustment and control, observations made in 1915–16 and in 1923–24 on the efficiency and limitations of a selected group of 17 representative municipal water-purification plants treating raw waters of the general type found in the Ohio and other rivers of the Middle Western and Eastern States.[2] During the progress of the experimental studies, a further observational survey was made of the performance of a second group, consisting of 14 municipal filtration plants treating raw waters taken from the Great Lakes and their interconnecting waters.[3]

From these combined experimental and observational studies, involving the operation of the experimental plant for a period of five years and the collection and analysis of performance records from 31 municipal water-purification systems, a considerable volume of comparative data was obtained bearing on the efficiency and limitations of water-purification processes currently used in the areas embraced by the studies. In this final paper of the present series, it is purposed to summarize very briefly the results of these combined experimental and observational studies and to state whatever general conclusions may appear justified from them.

[1] See Public Health Reports, Oct. 1, 1926, pp. 2121–2146 (Reprint No. 1114), July 15, 1927, pp. 1841–1859 (Reprint No. 1170), July 4 and 11, 1930, pp. 1521–1536 and 1597–1623 (Reprint No. 1392); Dec. 19, 1930, pp. 3105–3128 (Reprint No. 1434).

[2] For a detailed report of these observations, see Public Health Bulletin No. 172.

[3] For a full report of this survey, see Public Health Bulletin No. 193.

For convenience of reference, the three series of observations embraced by these studies, together with the data obtained from them, may be designated as follows:

Series A: Experimental studies at Cincinnati.

Series B: Observational surveys of filtration plants located along the Ohio River.

Series C: Observational surveys of filtration plants located along the Great Lakes.

In the present report, Series B has been limited to the observations made in 1923–24 at 10 filtration plants located on the Ohio River. The results obtained at the other 7 plants included in the 1923–24 survey having been similar to those observed at the 10 Ohio River plants, their inclusion would not serve any added purpose in the case at hand.

RELATIVE CONDITIONS OF OBSERVATIONS

The conditions under which both the experimental and field observations of these studies were made have been so fully described in previous reports [4] that attention will be confined here to pointing out a few important similarities and divergences in them affecting the interpretation of the data.

As the experimental plant drew its main raw-water supply from the Ohio River, the conditions in this respect under which the observations of Series A and B were made were very similar. They diverged, however, in both of these series from conditions in Series C, in that raw-water supplies taken from the Great Lakes differ from those of the Ohio River, both in their general character, notably in respect to turbidity and alkalinity, and in the manner and extent of their variability. Along the Great Lakes, variations in the quality of water at the intakes thus are often wide and sudden and are unaccompanied by corresponding changes in turbidity, whereas in the Ohio River they are usually less sudden and are marked by readily perceptible changes in turbidity.

Although a large majority of the 31 municipal filtration plants surveyed were of the same general type as the experimental plant, embodying the usual features of the rapid-sand filtration process, numerous variations in certain factors of their design and operation were observable. To afford a basis for comparison of some of the more important factors, the following relative figures have been transcribed from the descriptive data contained in previous reports of these studies: [5]

[4] See Public Health Bulletin No. 172, pp. 41–43, 69–73, and 175–177; Public Health Bulletin No. 193, pp. 6–9; Reprint No. 1114 (pp. 9–12) from Public Health Reports.

[5] See Reprint No. 1114 (pp. 1–9) from Public Health Reports; Public Health Bulletin No. 172, Appendix C, pp. 400–403; Public Health Bulletin No. 193, Appendix A, pp. 90–92.

	Range	Mean
1. Average total sedimentation period (hours) (based on rated capacity):		
Experimental plant (Series A)	3–12	6
Ohio River plants (Series B)—		
a. With double-stage sedimentation	10–66	[a] 32
b. With single-stage sedimentation	2–16	6
Great Lakes plants (Series C)	2– 8	3. 4
2. Average coagulant dosage:		
Experimental plant (Series A)	0. 5–4. 9	2. 6
Ohio River plants (Series B)	0. 3–4. 9	1. 2
Great Lakes plants (Series C)	0. 6–5. 6	[b] 1. 6
3. Filtration:		
a. Average rate (million gallons per acre daily)—		
Experimental plant (Series A)		125
Municipal plants (Series B and C)	60–150	95
b. Effective size of sand (minimum)—		
Experimental plant (Series A)		0. 40
Municipal plants (Series B and C)	0. 30–0. 76	0. 44
c. Depth of sand (inches)—		
Experimental plant (Series A)		27
Municipal plants (Series B and C)	24–36	30

In connection with these relative figures it is particularly noteworthy that the total periods of sedimentation provided at the five Ohio River plants equipped with double-stage sedimentation were very considerably in excess of those afforded both by the experimental plant and by the five Ohio River plants having only single-stage sedimentation, which were approximately the same. The corresponding periods for which the Great Lakes plants were designed were decidedly less than at either the experimental or the Ohio River plants. It also will be noted that the rates of filtration observed at both groups of municipal plants combined averaged about 25 per cent lower than the standard rate, 125 million gallons a day, used at the experimental plant. In all other respects, except for the somewhat higher coagulant dosage at the experimental plant, the average physical conditions of operation shown by the comparative figures were fairly similar for all three series of observations.

COMPARABILITY OF LABORATORY DATA

The laboratory data obtained from each of the three series of observations were based largely on the current "Standard Methods" of the American Public Health Association. In connection with the observations of Series A and B, carefully standardized methods, prescribed in detail, were followed. In those of Series C, it was necessary to use laboratory data forming a part of the past record of each plant; hence the laboratory methods followed were not subject

[a] Average period of primary sedimentation=27 hours, or 85 per cent of total.

[b] Corrected for error in average for 1 plant (Ashtabula), as given in Public Health Bulletin No. 193, Table No. 8, p. 37. The correct average for this plant should be 0.9 g. p. g.

to standardized control. In so far as the *B. coli* data were concerned, those reported from 9 of the 14 Great Lakes plants surveyed were found to be satisfactory for comparative purposes The *B. coli* data obtained from the 10 Ohio River plants (Series B) were subject to a single deficiency in that the routine tests made on the filtered and final (chlorinated) effluents were confined, in each case, to five 10-cubic centimeters portions of each sample In Series A and C, however, results from tests of these effluents were available in added single portions of 1.0 cubic centimeters and 0.1 cubic centimeters, respectively, thus permitting the detection of this group of organisms in densities higher than was possible in the more limited tests of Series B.[6]

In spite of the effort made to secure well-standardized bacteriological data, minor divergences in laboratory methods, due in some cases to variances in established technique, doubtless affected the comparability of the results reported from the different plants. As regards the ordinary physical and chemical determinations, the diversity in methods and results among the several plants probably was relatively small, as these methods are well established and the results obtained from them are influenced to a less extent by minor variations in technique than is the case with the bacteriological tests.

OBSERVATIONS ON BACTERIAL EFFICIENCY

In previous reports of these studies, detailed tables and illustrative charts have been presented showing the average efficiencies of bacterial removal, average quality of effluents, and relations between bacterial quality of influent and effluent waters noted in each one of the three series of observations embraced by the studies. These data will be brought together here mainly in the form of comparative charts, omitting the detailed tabulations of such data already presented, for which reference is made to the reports above indicated.

AVERAGE EFFICIENCIES OF PURIFICATION

The average efficiencies of purification observed in these studies have been expressed generally in terms of the percentages of raw, or influent, water bacteria remaining in the effluent of a given stage of treatment, rather than in terms of the percentages of bacteria removed. This method has permitted a more ready comparison of significant differences in the smaller figures than would be the case if the corresponding percentages of bacteria removed were given. In these reports the term "influent" water, as distinguished from "raw" water, has been used to designate water delivered to any given stage of treatment.

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[6] See Public Health Bulletin No. 172, pp. 22-84, also Reprint No. 1170 (pp. 11-14) from Public Health Reports.

In Figures 1 and 2 are shown graphically the residual percentages of 37° C. plate-growing bacteria and of *B. coli* at each stage of treatment, derived from averages for each series of observations. In Figure 1 the percentages have been referred to the bacterial content of the raw water, and in Figure 2 to that of the influent water of each stage of treatment, the latter thus representing the relative efficiencies of each separate stage. In order that the percentage figures derived from the three series of observations might be more nearly comparable among themselves, they were derived from averages taken over periods in which the mean density of bacteria in the several raw waters was approximately the same,[7] though the period in each instance approximated one year.

On comparing the corresponding percentages given in the table for the three series, certain interesting similarities and contrasts are noted. First is the general parallelism shown between the average efficiency of the experimental plant and that of the Ohio River plants (Series A and B),[8] which was an important factor in determining the applicability of the experimental results to parallel conditions of full-scale plant performance. Second is the well-marked superiority exhibited both by the experimental plant and the average Ohio River plant, as compared with the average Great Lakes plant, in respect to the bacterial efficiency of the prefiltration and filtration stages of treatment. Less divergence in this respect was shown between the over-all efficiencies of bacterial removal, including postchlorination, indicating that the Great Lakes plants, by throwing a relatively greater burden of purification on the postchlorination treatment, were able to offset in part their lower sedimentation and filtration efficiency.

That the proportion of the total burden of purification borne by postchlorination was higher at the Great Lakes plants than observed in the treatment of Ohio River water is shown more clearly by the comparative percentages of the total raw-water bacteria removed by each stage of treatment, presented in Table 1, computed from differences in the residuals at each stage, as given in Figure 1.

TABLE 1.—*Raw-water bacteria removed by each stage of treatment*

Stage of treatment	Percentage of total raw-water bacteria removed—					
	24-hours, 37° C, plate count			B coli index		
	Series A	Series B	Series C	Series A	Series B	Series C
Coagulation-sedimentation	72 9	82 6	59 0	60 1	77.5	62 7
Filtration	25 9	16 6	27 2	39 78	22 42	32 50
Postchlorination	1.14	.68	12.36	.10	.07	4.24
Combined	99 94	99.88	98.56	99 98	99 99	99 44

[7] See Reprint No. 1114 (pp 21-22) from Public Health Reports.

[8] A single exception is noted in the higher efficiency of chlorination shown by the experimental plant in the removal of 37° C plate-growing bacteria. This observation was inconsistent, however, with the corresponding indicated efficiency of *B coli* removal, which agreed fairly well for the two series.

It thus is indicated that at the experimental plant and the average Ohio River plant, all except approximately 1 per cent, or less, of the raw-water bacteria were removed prior to final chlorination, whereas at the average Great Lakes plant the proportion of the total bacteria

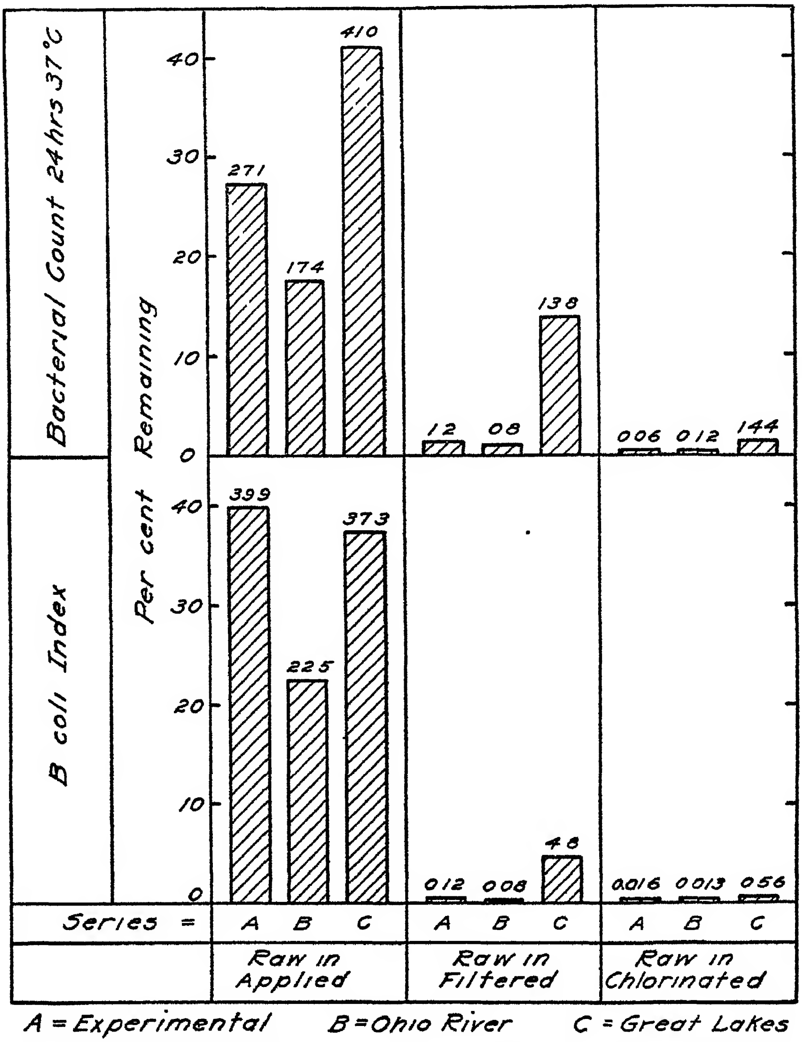

FIGURE 1.—Comparative average percentages of raw water bacteria remaining in effluents of successive stages of treatment

removed at this final stage was about 12.4 per cent in terms of the 37° C. plate-growing bacteria, and 4.2 per cent in terms of *B. coli*. Considering the three series of observations combined, approximately two-thirds of the total purification was effected by coagulation-sedimentation, and about one-thirtieth by postchlorination.

As to the possible reasons for the lower efficiency of the Great Lakes plants, with postchlorination excluded, these studies have afforded only indirect evidence, though a detailed comparative study of two Great Lakes plants and two Ohio River plants of the same type and design has indicated that it can not be attributed directly to the greater clarity of Great Lakes water.[9] It is possible that the marked divergence existing between the pH value of the Great Lakes water, which ranges from 7.8 to 8.2, and that of Ohio River water, ranging from 6.8 to 7.2, may account in part for the difference observed, as experiments made in connection with these studies have indicated [10] that the bacterial efficiency of coagulation-sedimentation may become sharply diminished at pH values exceeding 7.0 or thereabouts. It also may be possible that in the purification of Great Lakes waters the lower dosages of coagulant used, which are adequate for clarification but not sufficiently high for more effective bacterial reduction, and also the lower average periods of sedimentation provided, may account in part for the divergence observed in this respect. In the coagulation of Ohio River water, the greater amounts of coagulant required for clarification and the longer sedimentation periods used would tend to result in higher degrees of bacterial removal. These assumptions may be justified in view of the current tendency in the operation of municipal rapid-sand filtration plants to depend largely on chlorination for bacterial removal and assign to the preliminary sedimentation and filtration processes merely the function of clarification.

VARIATIONS IN BACTERIAL EFFICIENCY

An outstanding characteristic of the efficiency of bacterial removal observed in the experimental studies and at the several municipal filtration plants was its wide degree of variability, both among the different individual plants as compared with each other and at each plant from day to day and month to month. In so far as the variations noted among the individual plants were concerned, they were found to bear a fairly broad relation to divergences in the mean density of raw-water pollution [11] and to certain factors of plant design and operation, such as, for example, the total period of sedimentation and the average dosage of coagulants. [12]

Diurnal and other temporal variations in the over-all bacterial efficiency of each plant, and likewise in the efficiency of individual stages of treatment, were difficult to explain in many instances, though in general they were found to be related to fluctuations in the turbidity and bacterial content of the raw water and in certain conditions of

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[9] See Public Health Bulletin No. 193, Appendix B, pp. 93–100.

[10] See Reprint No. 1392 (pp 20–26) from Public Health Reports.

[11] See Public Health Bulletin No 193, Tables 5A and 5B, pp. 29 and 31.

[12] See Public Health Bulletin No 193, pp 28–38, also Reprint No 1392 (pp. 1–16 and 27–41) from Public Health Reports.

treatment, notably the dosage of chemicals, which are subject to frequent changes and readjustments. Probably many conditions of plant operation, not ordinarily subject to precise record, may influence the efficiency of bacterial removal, such as minor variations in flow, in the elevation of water surface in basins, in the rate of filtration, in the density of floc formation and in the residual chlorine content of chlorinated effluents. From observations made in the course of the experimental studies, it was indicated that efficiencies of bacterial removal are extremely sensitive to minor changes in conditions such as those enumerated. Whatever their causes may be, these variations in bacterial efficiency appear to be a more or less normal phenomenon in the performance of water-purification processes, for which due allowance must be made in undertaking to evaluate such performance.

EFFECTS OF CERTAIN MODIFICATIONS IN PRELIMINARY TREATMENT

In the course of the experiments described in previous reports, several series of long-term observations were made on the effects of certain modifications in the preliminary treatment of water on the efficiency and limitations of the rapid-sand filtration process. For the purposes of these supplementary observations, minor changes were made in the construction and arrangement of the experimental filtration plant, as have been described in the preceding two reports [13] of this series. These changes involved mainly the division of the experimental plant into two parallel sections throughout and the installation of a mechanical agitator unit for use in connection with experiments on the efficiency of excess-line treatment. With the parallel-division arrangement, it was possible to compare the efficiencies observed with any two different treatments of the same raw water under identical conditions.

The experiments carried out under this heading were divided into the following four series:

1. The effects of variations in the period of sedimentation;
2. The effects of variations in certain conditions of coagulation;
3. The bacterial efficiency of raw-water prechlorination;
4. The bacterial efficiency of excess-lime treatment.

Of the four series of experiments above listed, all except the fourth, dealing with the bacterial efficiency of excess-lime treatment, have been fully described in previous reports of this series.[14] The fourth series has been discussed in connection with another paper.[15] In this report it is proposed to summarize very briefly the main conclusions derived

[13] Public Health Reports, July 4, 1930 (Reprint No. 1392), and Dec 19, 1930 (Reprint No 1434).
[14] See Public Health Reports, vol 45, Nos 27 and 28, July 4 and 11, 1930, pp. 1521-1536 and 1597-1623 (Reprint No. 1392), vol. 45, No. 51, Dec. 19, 1930, pp. 3105-3128 (Reprint No. 1434).
[15] Proc. Eighth Kansas Annual Water Works School, 1930, p. 42.

VARIATIONS IN SEDIMENTATION PERIOD[16]

from these four series of observations, referring to the previous publications noted for details.

The results of experiments regarding the effects of variations in the period of sedimentation on the bacterial efficiency of prefiltration treatment indicated that substantial gains in the efficiency of coagulation-sedimentation resulted from prolongation of the nominal period of sedimentation up to 8 or 9 hours and measurable gains with periods up to 12 hours. It also was shown that a relationship between the bacterial quality of influent and effluent waters was connected with the period of sedimentation by the following equations:

$$E_a = \frac{0.572}{\log T} \cdot R^{0.86} \tag{1}$$

$$E_c = \frac{0.000344}{\log T} \cdot R^{0.88} \tag{2}$$

in which (R) donotes the *B. coli* index of the raw water (E_a), the corresponding *B. coli* index per 100 cubic centimeters of the applied (coagulated-settled) water, (E_c) the corresponding *B. coli* index (per 100 cubic centimeters) of the postchlorinated filtered effluent, and (T) the nominal period of sedimentation, in hours. These relationships are of interest mainly as indicating that the efficiency of sedimentation, when measured in bacterial terms, appears to be a logarithmic function of the total sedimentation period, all other conditions being equal. The importance of the time factor in settling-basin efficiency is thus emphasized.

VARIATIONS IN CONDITIONS OF COAGULATION[17]

The results of experiments made on the effects of variations in certain conditions of coagulation led to the following main conclusions:

(1) Variations in the pH of the coagulation reaction from 5.6 to 6.9 produced little effect on the efficiency of coagulation-sedimentation, with aluminum sulphate as the coagulant. The efficiency with this same coagulant became sharply diminished, however, with pH values exceeding 7.0 and slightly improved with pH values approaching 5.5.

(2) The bacterial efficiency of double-stage coagulation, with two separate stages of sedimentation, was consistently greater than that of single-stage coagulation with one stage of sedimentation, though with the same total amount of coagulant and the same total period of sedimentation, little if any difference was observable between the results shown by double-stage and single-stage coagulation when carried out in conjunction with two separate stages of sedimentation.

[16] See Public Health Reports, July 4, 1930, pp. 1521–1536 (Reprint No. 1392, pp 1–16)

[17] See Public Health Reports, July 11, 1930, pp 1597–1623 (Reprint No. 1392, pp. 16–42).

This observation was consistent with that of the relatively higher efficiency of double-stage sedimentation at five Ohio River plants, which was associated with much longer total periods of sedimentation than were provided at the plants of this group equipped with only single-stage sedimentation.

(3) A fairly consistent relation was shown between the amounts of coagulant added to the raw water and the resulting bacterial efficiency. This relation was found to hold irrespective of raw-water turbidity or bacterial content, though it was more apparent when the turbidity and bacterial numbers were higher.

From these conclusions, the general inference may be drawn that measurable gains in the efficiency of water-filtration processes of the rapid-sand type can be attained through prolongation of the total period of sedimentation, through the addition of greater amounts of coagulant, and, to some extent, through adjustments of the hydrogen-ion concentration of the coagulation reaction, though where lime and sulphate of iron are used this third condition would be relatively unimportant, owing to the broader zone of insolubility of iron, as compared with aluminum hydroxides. Perhaps the most interesting result of these particular experiments, however, was the observation that double-stage coagulation-sedimentation does not appear to have any well-marked advantage over single-stage treatment of the same kind, where the total periods of sedimentation are the same. Considered in the light of this observation, the higher efficiency of the five Ohio River plants equipped with double-stage sedimentation may be explained in view of the longer total periods of retention provided by the combined primary and secondary basins at these plants.

RAW WATER PRECHLORINATION [18]

From the series of experiments in raw-water prechlorination it was concluded that this auxiliary measure of treatment, when used in conjunction with rapid-sand filtration, results in a decided gain in over-all bacterial efficiency, though it was noted that the application to filters of water containing even small amounts of residual chlorine caused a definite reduction in the bacterial efficiency of filtration and of postchlorination, respectively. Chlorination of water prior to filtration also appeared to effect a partial sterilization of the upper portion of the filtering medium, though the experiments with heavy prechlorination were not continued for a period sufficienctly long to show whether complete sterilization of rapid-sand filters could be brought about through this means.

[18] See Public Health Reports, Dec. 19, 1930, pp. 3105–3128 (Reprint No. 1434).

EXCESS-LIME TREATMENT

Observations on the bacterial efficiency of excess-lime treatment occupied a period of about seven months in 1928 and 1929.

The results of these experiments indicated that a well-marked bacterial reduction occurs in lime-treated water when the residual pH approaches or exceeds about 10.0, which figure corresponded in the raw water treated (i. e., Ohio River) to 15 or 20 parts per million of causticity. For pH values lower than 10.0 the bactericidal action of excess-lime appeared to become greatly diminished when the pH reached 9.0, or the causticity approached zero. Little or no bactericidal action was evidenced in the absence of causticity, even when monocarbonate alkalinity was present to the extent of 15 or 20 parts per million. These observations were made with a contact period of 6 hours. With longer periods, observations by Bahlman[19] have indicated that a measurable bacterial reduction may be accomplished by carrying a relatively low basicity, with no causticity, in the lime-treated water.

When viewed apart from its function in water softening and considered merely as a chemical method of water disinfection, excess-lime treatment did not appear, in these experiments, to have the extent of advantages possessed by prechlorination. Its main disadvantages, in comparison with prechlorination, were (*a*) its less consistent performance (*b*) the longer period of time required to complete its action, and (*c*) the difficulty experienced in maintaining a high degree of constancy in the residual pH or causticity. As a finished water containing causticity is undesirable, the use of excess-lime treatment for disinfection should be followed by recarbonation in order to adjust the chemical equilibrium of the water to a condition such that it will not cause after-deposits in mains and house fixtures.

From the viewpoint of these studies, the four series of experiments above indicated were of value chiefly in showing the extent to which the efficiency of ordinary rapid-sand filtration systems could be increased through various modifications in prefiltration treatment. They also provided a basis for estimating the degree to which the relationships observed between the bacterial quality of the raw water and the corresponding quality of the effluents of filtration processes would be affected by such modifications in treatment.

RELATIONS OBSERVED BETWEEN QUALITY OF INFLUENT AND EFFLUENT WATERS

Throughout the studies recorded in these reports a consistent relationship has been observed between variations in the bacterial quality of raw or influent waters, as delivered for treatment, and

[19] Bactericidal Action of Lime in Sub-Caustic Doses. C. Bahlman Rept Eighth Ann Ohio Conf on Water Purification, pp 56–59.

corresponding variations in the quality of the effluent waters produced from them at various stages of treatment The importance of this relationship lies in its indication that under conditions of practice, all processes of water purification in current use appear to be sur-

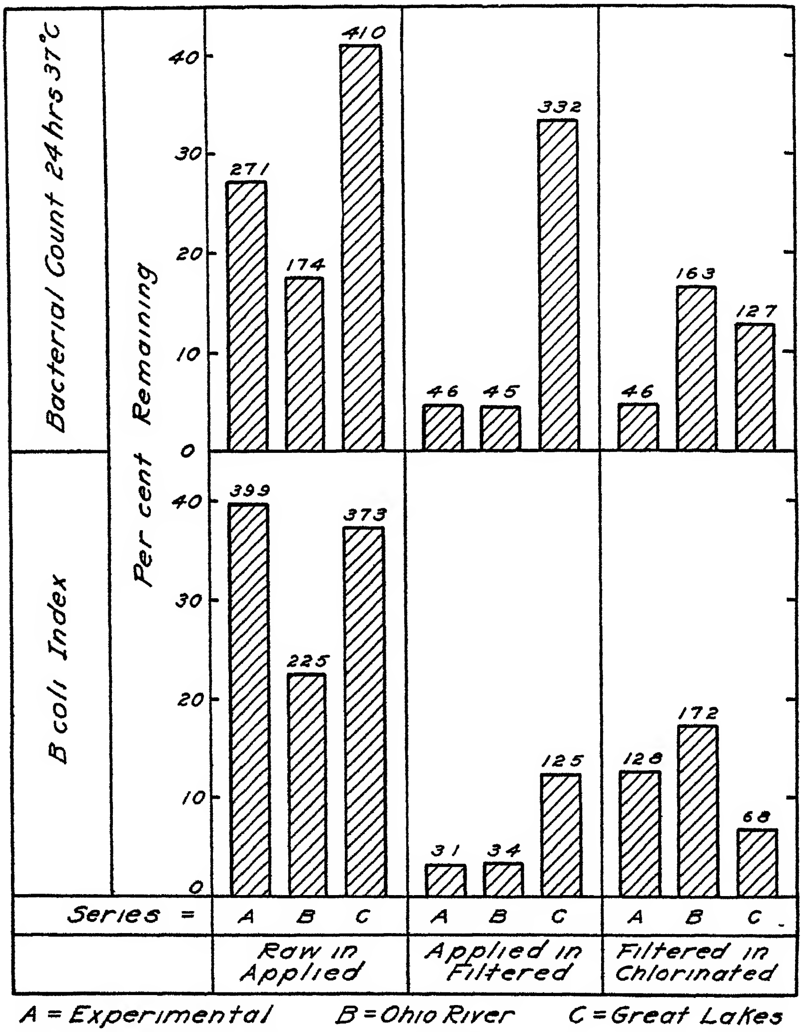

FIGURE 2 — Comparative average percentages of influent water bacteria remaining in the effluents of successive stages of treatment

rounded by definite limitations in respect to the quality of effluents which they can produce with varying degrees of raw-water pollution, and, conversely, to the permissible maximum degree of raw-water pollution consistent with the production of effluents of specified quality.

The consistency with which the relationship in question has been observed in these studies may be more fully appreciated by referring to detailed tabulations given in previous reports [20] It is sufficient to note here that it was evidenced in the performance data of each one of the 31 municipal filtration plants surveyed and likewise in the corresponding data obtained from the experimental filtration plant throughout its period of operation In some individual municipal plants it was more apparent than in others, but such a variation

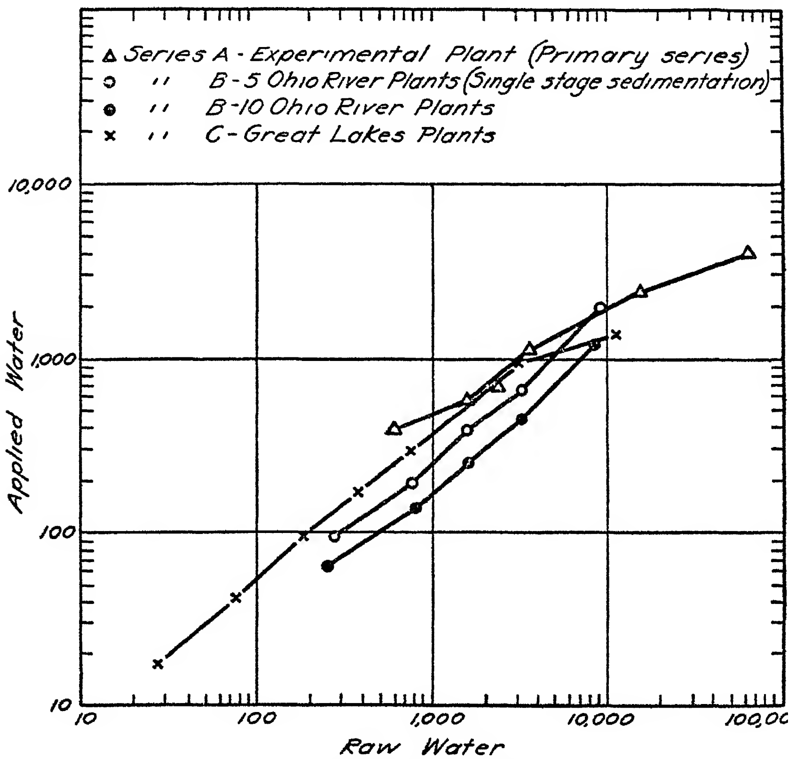

FIGURE 3 —Relations between average numbers of bacteria observed in raw and applied waters. (Bacterial count per cubic centimeter, 24 hours, 37° C)

would be expected in view of the wide differences in the conditions of operation surrounding these plants.

In order to illustrate graphically the trend of these relationships, Figures 3 to 10, inclusive, have been prepared from average data [21] obtained in the three series of observations indicated in the charts. In the plots designated as Series B, the data from the municipal filtration plants along the Ohio River have been divided into two

[20] See Public Health Bulletin No 172, Tables 39, 40, 63, 64, and 65, Public Health Bulletin No 193, Tables 9, 10 and 11, and Reprint No 1114 (Table No 1) from Public Health Reports

[21] See Public Health Bulletin No 172, Tables 12 and 43, Public Health Bulletin No 193, Tables 13 and 14, and Reprint No 1114 (Table No 1) from Public Health Reports.

subseries, one based on the average performance of the entire group of 10 plants surveyed and the other on that of 5 of these plants equipped with single-stage sedimentation (the remaining 5 plants of this group were provided with double-stage settling basins with decidedly longer total periods of sedimentation)

Two particularly noteworthy characteristics of these plots are their tendencies in a majority of the cases to follow roughly parallel slopes and approximately straight-line trends on the logarithmic

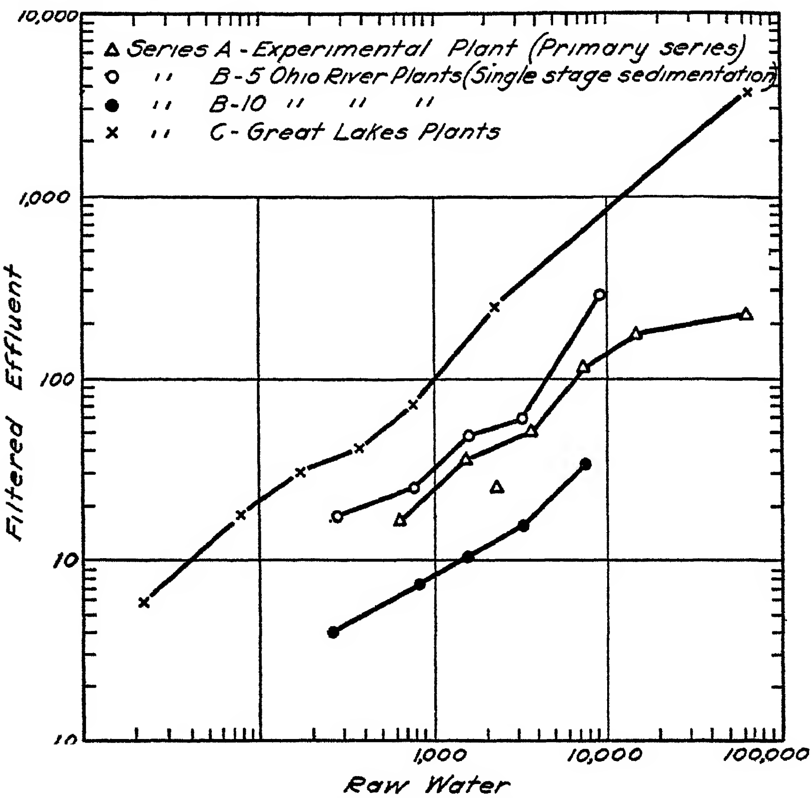

FIGURE 4.—Relations between average numbers of bacteria observed in raw and filtered waters. (Bacterial count per cubic centimeter, 24 hours, 37° C.)

plotting scales used. Although some of the plots show a considerable degree of spread in their relative positions, others appear to follow very nearly the same trend, notably those showing the relations between the bacterial contents of the raw and applied waters and of the unchlorinated and chlorinated waters. The widest degree of variability was indicated in the relative efficiencies of filtration. In the series designated as "B" and "C," they represent the performance of the average Ohio River and Great Lakes plants, respectively.

NATURE OF BACTERIAL RELATIONSHIPS

In previous reports [22] of these studies it has been shown that the relationships observed between the bacterial quality of the raw, or influent, water and the corresponding quality of the effluent obtained from each successive stage of treatment are, in general, linear functions of the logarithms of these two variables, expressed by the straight-line equation:

$$\log E = n \log R + \log c \tag{3}$$

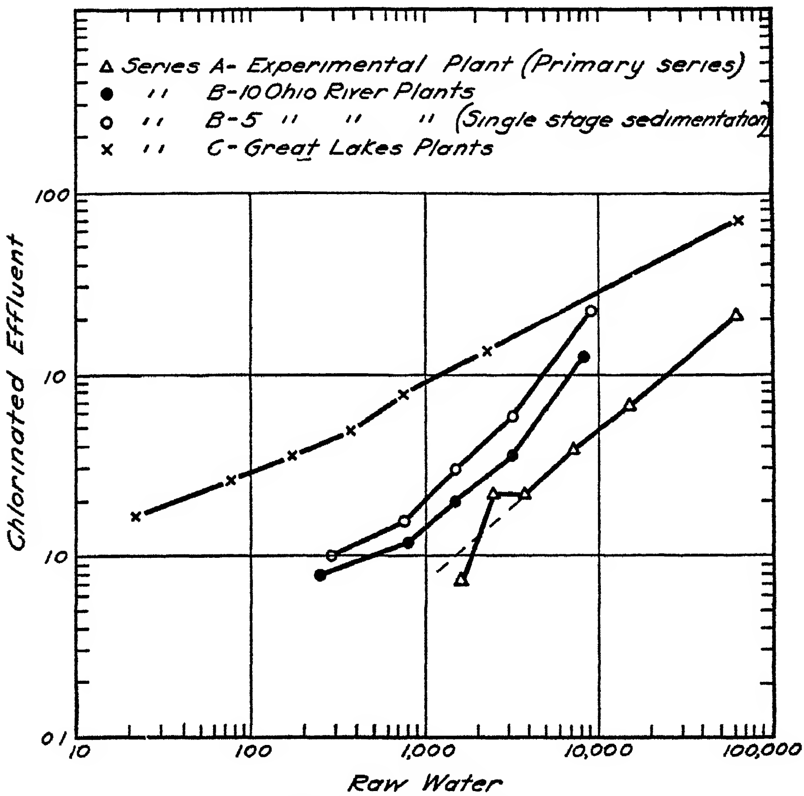

FIGURE 5.—Relations between average numbers of bacteria observed in raw and post-chlorinated waters (Bacterial count per cubic centimeter, 24 hours, 37° C)

in which (R) denotes the bacterial content of the raw, or influent water, (E) the corresponding bacterial content of the effluent, and (c) and (n) empirical constants defining, respectively, the value of (E) when (R) equals unity and the linear slope of the straight line representing the relationship between the logarithms of the two variables.

[22] See Public Health Bulletin No 172, pp. 31-32 and 124-133, Reprint No 1114 (pp. 12-15) from Public Health Reports, and Public Health Bulletin No. 193, pp. 51-52.

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When this linear equation (3) is cleared of logarithms, the relationship becomes the power function:

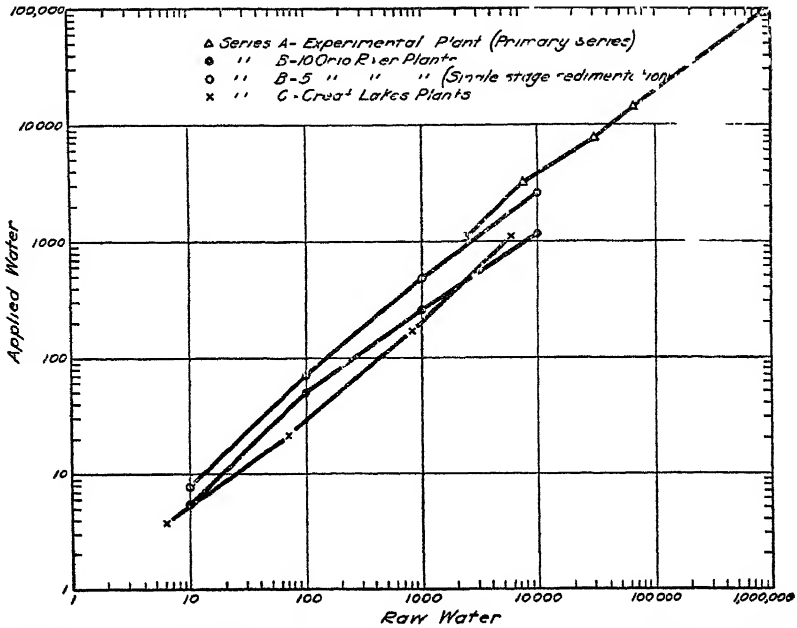

Figure 6—Relations between average numbers of B coli observed in raw and applied waters. (B coli index per 100 cubic centimeters)

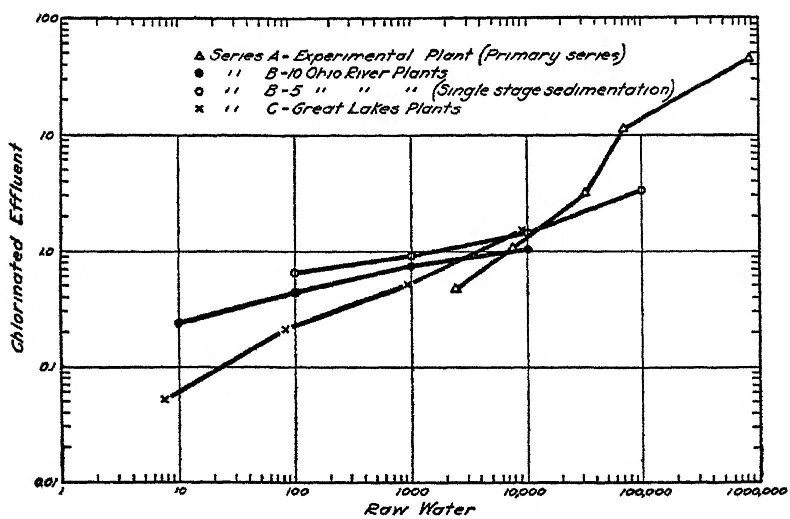

Figure 7.—Relations between average numbers of B coli observed in raw and post-chlorinated waters. (B coli index per 100 cubic centimeters)

$$E = cR^{n} \tag{4}$$

n which all of the terms have the same significance as above defined.

The consistency with which the bacterial relationships observed in these studies, both in the performance of the experimental plant and in that of the several individual municipal plants surveyed, tended to conform to this equation has suggested that it constitutes virtually a basic law underlying the performance of water-purification processes in general, applicable alike to individual stages of treatment, such as sedimentation, filtration, and chlorination, and to various combinations of these processes. In this connection it is of interest

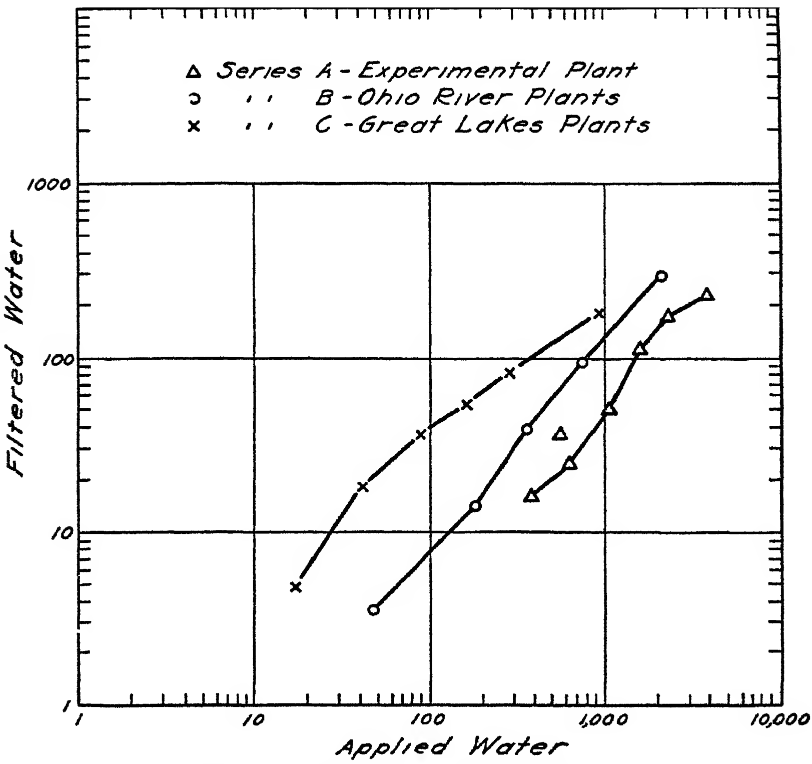

FIGURE 8.—Relations between average numbers of bacteria observed in applied and filtered waters. (Bacterial count per cubic centimeter, 24 hours, 37° C.)

to note that, since the publication of the earlier reports of these studies, the general applicability of this law both to water-purification and to sewage-treatment processes has been confirmed by the observations of Malischewski [23] in Europe.

The close analogy of equation (4) to the well-known Freundlich equation, defining the law governing adsorption phenomena, is both interesting and of possible significance, in view of the consistency with which it appears to express the relationships above described.

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[23] Two Laws of Water Purification N. Malischewski, Gesund. Ing., vol 52, p. 569, 1929 Abstract in Summary of Current Literature, Water Pollution Research Board (Great Britain), vol. 3, No. 1, January, 1930, No 16, p 4.

Although the natures of the several processes involved in water purification differ from each other in their modes of action, such as, for example, in that of sedimentation as contrasted with filtration, all of them are essentially extractive processes and probably subject to laws very similar in their resultant effects to those governing a phenomenon such as adsorption. The practical significance of this principle, in so far as it applies to the performance of water-purification processes, is that although the efficiency of these processes

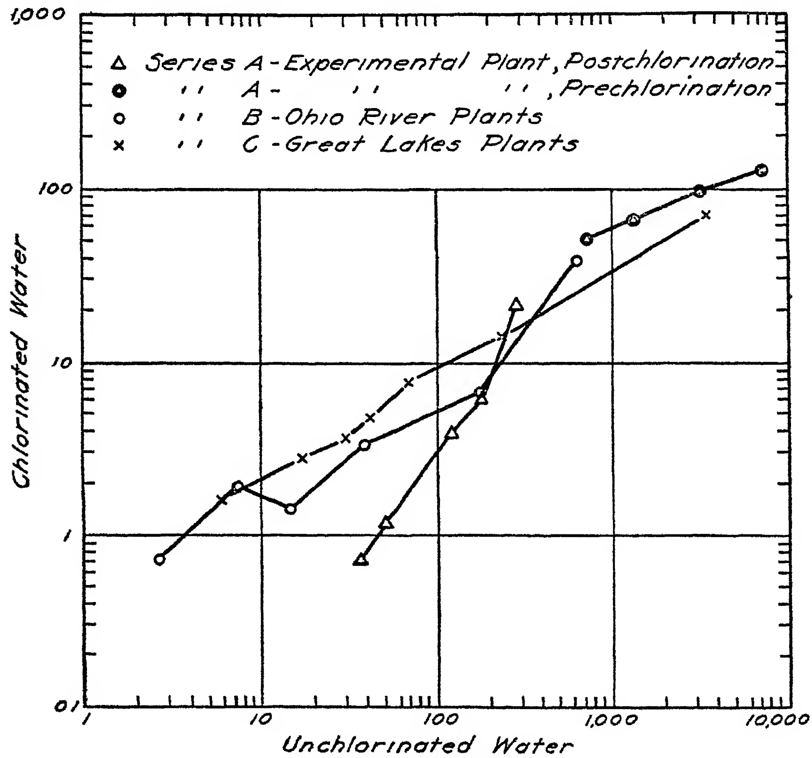

FIGURE 9.—Relations between average numbers of bacteria observed in unchlorinated and chlorinated waters. (Bacterial count per cubic centimeter, 24 hours, 37° C)

tends, as shown in previous reports, to become increased, under normal conditions of operation, coincidently with an increase in raw or influent water pollution, the former does not appear to be sufficient to offset the latter under ordinary conditions of existing routine practice.

APPLICATION OF BACTERIAL RELATIONSHIPS

The bacterial relationships developed from these studies have been useful both as a means for comparing the performance of different plants, or processes, under similar conditions of bacterial loading and as a basis for estimating either the quality of effluent obtainable from

a raw or influent water of a given degree of bacterial pollution or conversely the limiting density of raw or influent water bacteria within which an effluent of specified quality might be produced, by a particular combination of treatment. The former of these two applications of the data may be readily understood by referring to Figures 3 to 10, inclusive. The latter will be discussed more fully, as it has an important bearing on the main objectives and conclusions of these studies.

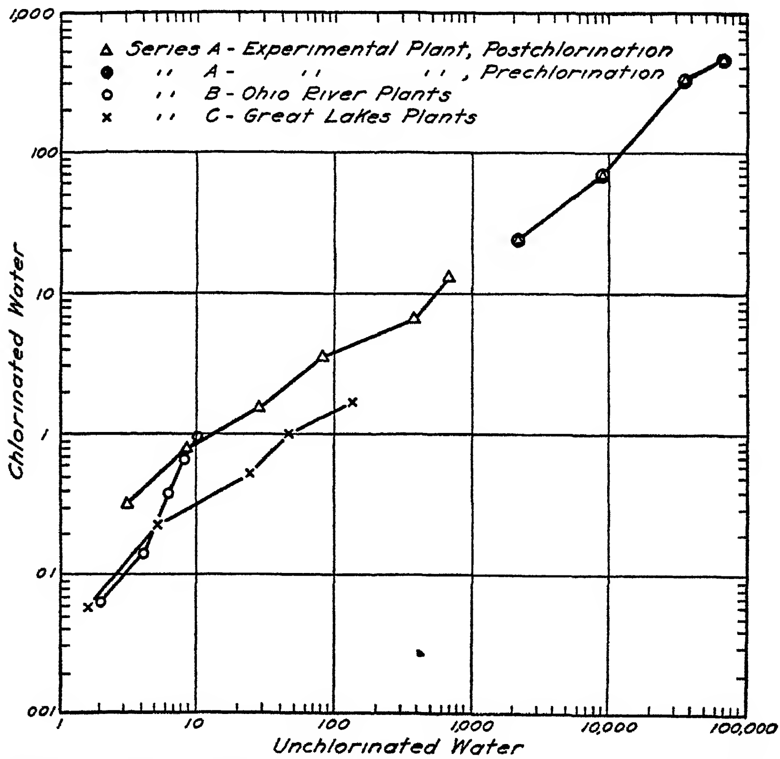

FIGURE 10.—Relations between average numbers of B coli observed in unchlorinated and chlorinated waters (B coli index per 100 cubic centimeters)

A practical test of the validity of these bacterial relationships has been the extent to which they might be utilized for estimating the bacterial content of a raw or of an effluent water corresponding to a known or assumed density in the other of these two variables. In previous reports [24] it has been shown that estimates of this kind, based on derived values of (c) and (n) as given in equations (3) and (4) have yielded average results consistent, within the range of observational error, with those actually recorded at full-scale municipal

[24] See Public Health Bulletin No. 172, pp. 37-39 (Table No 21), also Public Health Bulletin No. 193, pp. 67-71 (Tables Nos. 18 and 19).

plants under parallel conditions of raw-water pollution. From the general concordance noted between the estimated and observed results in these instances, it has been concluded that properly selected values of (c) and (n) should permit a reasonably accurate approximation of the maximum permissible density of bacteria in a raw-water consistent with the production of an effluent of specified quality, assuming an average plant of a given type and degree of elaboration, treating water from a given general source.

From several series of estimates of the character made in connection with previous reports [25] the following raw-water *B. coli* maxima have been selected as best representing the limiting numbers of this organism in Ohio River and Great Lakes waters, from which effluents meeting the primary requirement of the Treasury Department *B. coli* standard can be produced by the average plant of the more efficient type using the various combinations of treatment indicated:

Treatment	Limiting raw-water *B. coli* index per 100 c. c. (round number.)	
	Ohio River	Great Lakes
(1) Chlorination alone	60	50
(2) Coagulation, sedimentation, and rapid-sand filtration (without chlorination)	80	60
(3) Same as (2) with prechlorination	3, 500	(1)
(4) Same as (2) with postchlorination	6, 000	4, 500
(5) Same as (2) with both prechlorination and postchlorination	20, 000	(1)
(6) Same as (4) with double-stage sedimentation (relatively long sedimentation period)	60, 000	(1)

[1] No observations.

These raw-water *B. coli* maxima have been based in part on the following values of (c) and (n) in equations (3) and (4), as derived in connection with previous reports,[26] the values for the treatment of Ohio River water having been combined from those obtained from the experimental studies and from the 1924 observational survey of 10 municipal filtration plants located on this river:

Treatment	(c)	(n)
(1) Chlorination alone:		
(a) Ohio River	0. 015	0. 96
(b) Great Lakes	0. 050	0. 76
(2) Coagulation, sedimentation and rapid-sand filtration, without chlorination:		
(a) Ohio River	0. 070	0. 60
(b) Great Lakes	0. 087	0. 60
(3) Same as (2), with post-chlorination:		
(a) Ohio River	0. 011	0. 52
(b) Great Lakes	0. 040	[1] 0. 38
(4) Same as (3), with double-stage sedimentation (relatively long sedimentation period)	0. 064	0. 25

[1] The more precise figure is 0.383.

NOTE.—For rapid-sand filtration treatment with prechlorination, the raw-water maxima were derived directly from the plot shown in fig. 8, in Reprint No. 1434 from Public Health Reports.

[25] See Public Health Bulletin No. 172, pp. 36–39, 136–143, and 212–213, Public Health Bulletin No. 193, pp. 71–72 and 85–86, and Reprint No. 1114 (pp. 23–24), Reprint No. 1392 (p. 15), and Reprint No. 1434 (pp. 15–17) from Public Health Reports.

[26] See Public Health Bulletin No. 172, pp. 131–133, Public Health Bulletin No. 193, pp. 61–64 and 71; and Reprint No. 1114 (p. 14) from Public Health Reports.

It is of interest to note, in connection with the raw-water *B. coli* maxima above given, that the deviation shown between the two sets of corresponding figures (i. e., for the treatment of Ohio River and Great Lakes waters, respectively) was so small as to fall virtually within the range of observational error. For all practical purposes a single rounded mean could be applied in each case to the treatment of water from both general sources. It also is noteworthy that the raw-water maxima observed for chlorination alone and for ordinary rapid-sand filtration treatment without chlorination were practically the same, though the various combinations of these two processes gave much higher limiting figures than did either one considered separately.

It perhaps is well to emphasize that the limiting *B. coli* figures stated, as well as the values of (c) and (n) from which they have been derived, have been based on the combined average performance of the experimental plant (in the case of Ohio River water) and of the more efficient of the two groups of municipal plants surveyed, consisting of about one-half of the total in each group. They represent, therefore, the performance of the average plant of the more efficient type, rather than that of the average plant of the entire list of plants studied. If these data were applied to a large group of plants having the usual wide range of diversity in their efficiencies, some of the plants of such a group doubtless could treat successfully a raw water more highly polluted than indicated by the *B. coli* maxima above given, and other plants of the same group would have, on the other hand, great difficulty in treating such a water. Unless the efficiency of a given plant happened to fall very near to that of the average plant of the more efficient type from which these data have been derived, a bacterial relationship curve based on its performance probably would give values of (c) and (n) diverging considerably from those above stated. These limiting conditions should be borne clearly in mind in undertaking to apply the results of these studies to the performance of individual water-purification systems.

GENERAL CONCLUSIONS

The studies described in these reports have justified certain general conclusions, which may be stated very briefly as follows:

(1) The results obtained from the studies appear to be fairly representative of those which may be expected, under normal conditions of practice, from the average process or plant of the types observed, when treating waters similar to those of the Ohio River and Great Lakes, respectively.

(2) Although the efficiencies of some individual water-purification plants have been found to vary considerably among themselves, the average efficiencies of groups of plants have shown a very fair degree of mutual consistency, even in the treatment of raw waters taken

from different general sources. The divergences in this respect noted as between the average plants treating Ohio River and Great Lakes waters, respectively, though measurable, have not appeared significantly great. In many instances diversities in performance as between individual plants have been related definitely to variations in certain features of plant design. In a few cases no reason could be assigned for such differences.

(3) The relationships observed between raw or influent waters and effluent waters in respect to concurrent variations in their bacterial quality appear to be governed by a fundamental law, characteristic of all processes of water purification and simulating adsorption phenomena in its effects. The restrictions imposed by such a law on the efficiency of bacterial removal are such as to limit the average quality of effluent obtainable by a particular combination of treatment from a raw water of a given average degree of pollution and, conversely, the maximum pollution of a raw water from which an effluent of specified average quality can be produced.

(4) The efficiency of the ordinary more simple processes of water purification can be increased very measurably by means of certain modifications and elaborations in prefiltration treatment, notably by prechlorination, by longer periods of sedimentation, and by improved coagulation resulting from such measures as pH control and the more liberal dosage of coagulants. Similar results doubtless can be obtained by modifications and elaborations other than those included in these studies.

The opportunities afforded during this investigation for observing the natural purification efficiency of prolonged storage of water prior to artificial treatment were very limited, but they were sufficient to point very clearly to the advantages inherent in this process, as a measure for effecting a preliminary improvement in the physical and the bacterial quality of highly polluted waters. The possibilities of this method, either through the construction of storage reservoirs or the impounding of water in flowing streams, have not thus far been fully utilized in this country, though they are widely recognized in certain European countries, notably in England, where storage is practiced extensively in connection with artificial water treatment. Although the difficulty and expense involved in providing long storage of water doubtless would be great in many instances, particularly in the level sections of the Middle West, its feasibility has been demonstrated even under such relatively unfavorable circumstances. It will be used more generally in the future than in the past, as its great advantages become more fully appreciated.

It appears to be the opinion of some water-purification specialists that virtually no limit exists as to the degree of raw-water pollution which can be successfully dealt with by a sufficiently elaborated

combination of water-treatment processes now available. Particularly noteworthy is this sentiment among advocates of highly intensified methods of chlorination such as have been developed during recent years Although such a result is theoretically possible and has been producible on an experimental scale, the practical difficulties standing in the way of its attainment in routine large-scale water-purification operations are well exemplified by the observations made, in the course of these studies, of the actual performance of 31 municipal water-filtration plants, a large majority of which are required to handle raw waters of high and widely variable degrees of pollution. In no instance has conclusive evidence been afforded that these plants could produce effluents of satisfactory potability and sanitary quality from raw waters of unlimited degree of pollution. Moreover, the results of the experimental studies recorded in previous reports of this series have pointed clearly to the operation of a law of diminishing returns in the efficiency of multiplied processes of water purification. Although such multiplication appears to assure increased stability of performance in dealing with raw waters of highly variable quality, it exacts a penalty in a diminished efficiency of certain individual stages of treatment. These limitations should be taken into account in estimating the net advantages to be gained through elaborations involving multiple-stage treatment.

Finally, it may be noted that the restrictions which may be expected ultimately to govern the maximum permissible degree of pollution of sources of purified-water supplies in the industrial areas of this country may prove to be conditioned more largely by the growing difficulties experienced in obtaining treated effluents of acceptable palatability and wholesomeness for domestic use than by considerations affecting merely the bacterial quality of such effluents. In this connection, the possible relation of water-borne outbreaks of gastro-intestinal disturbances to the presence of chemically or biologically toxic substances in purified-water supplies, derived from sources highly polluted by sewage and certain kinds of industrial wastes, can not be wholly discarded, in view of the history of such outbreaks during the recent period of drought. Although the prevalence of urban typhoid fever has been reduced to a point such that it is now a minor cause of death, the occurrence of 242 water-borne outbreaks of this disease in the United States during the decade 1920–29, as recorded recently by Wolman and Gorman,[27] indicates that it has not been eliminated as a definite hazard. As 49 of the outbreaks thus recorded were due to failures of water treatment, it is evident that the mere existence of purification facilities has not conferred immunity from this disease.

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[27] Am. Jour. of Pub. Health, vol 21, No. 2, pp. 115–129 (Feb , 1931).

Future developments in the reinforcement of water-purification systems which may have to deal with raw waters taken from excessively polluted sources probably will tend to follow present lines, notably in the direction of intensified chlorination and the further elaboration and improvement of preliminary treatment of water. Storage, both natural and artificial, will assume a rôle of increasing importance in these developments. Treatment of sewage and of certain kinds of industrial wastes likewise will receive more attention as special measures of protection for sources of water supply. Further studies of the relative values of these several measures are needed, preferably along the general lines of combined observation and experiment such as have been followed in these studies. The present investigation has afforded a definite answer to the major questions involved in determining the limitations of current methods of water purification, in so far as the areas embraced by the survey are concerned. The study should be extended eventually to embrace those broader measures of protection, such as above noted, which have not been included in its more immediate field. The weaker links of water purification should receive more attention, as they doubtless hold the key to many of those lapses and variations in efficiency which thus far remain unexplained. From every angle other than those indicated, these studies may be considered as having been brought to a satisfactory conclusion.

COURT DECISION RELATING TO PUBLIC HEALTH

Law regulating barbering held constitutional and construed.—(Georgia Supreme Court; State Board of Barber Examiners et al. *v.* Blocker et al., 167 S. E. 298; decided Dec. 15, 1932.) An equitable petition was brought by two "beauticians" against the State board of barber examiners and certain other State officials to enjoin the enforcement against the plaintiffs of the statute regulating barbering and to have such law declared unconstitutional and void. The barber law was originally enacted in 1914 and was amended in 1920 and 1931. In the case of Cooper *v.* Rollins, 152 Ga. 588, 110 S. E. 726, 20 A. L. R. 1105, decided in 1922 by the Supreme Court of Georgia, the then existing law had been held constitutional. The court held that the principles there applied, with respect to constitutionality, were controlling in the instant case, and also declared that other attacks on the constitutionality of the 1931 amendatory act were without merit.

The court also held, adversely to the plaintiffs' contention, that "beauticians," beauty culture specialists, beauty culturists, hairdressers, and operators of beauty shops were subject to the barber

law. This holding was based on the following definition, contained in the 1931 act:

To shave or trim the beard, cut or dress the hair, to give facial or scalp massaging, facial or scalp treatment with oils or creams and other preparations made for this purpose, either by hand or mechanical appliances, to singe and shampoo the hair, or to dye the hair, of any living person for hire or pay shall be considered as practicing the profession of a barber within the meaning of this act.

DEATHS DURING WEEK ENDED MARCH 25, 1933

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Mar. 25, 1933	Corresponding week, 1932
Data from 85 large cities of the United States		
Total deaths	8,373	9,472
Deaths per 1,000 population, annual basis	11.7	13.5
Deaths under 1 year of age	607	687
Deaths under 1 year of age per 1,000 estimated live births [1]	53	57
Deaths per 1,000 population, annual basis, first 12 weeks of year	12.3	12.6
Data from industrial insurance companies		
Policies in force	68,730,271	73,749,858
Number of death claims	14,138	14,302
Death claims per 1,000 policies in force, annual rate	10.7	10.1
Death claims per 1,000 policies, first 12 weeks of year, annual rate	11.2	10.2

[1] 1933, 81 cities; 1932, 80 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended April 1, 1933, and April 2, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended April 1, 1933, and April 2, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Apr. 1, 1933	Week ended Apr. 2, 1932	Week ended Apr. 1, 1933	Week ended Apr. 2, 1932	Week ended Apr. 1, 1933	Week ended Apr. 2, 1932	Week ended Apr. 1, 1933	Week ended Apr. 2, 1932
New England States:								
Maine	5		4	204		184	0	2
New Hampshire						1	0	0
Vermont	1				14	110	0	0
Massachusetts	15	46	6	15	307	660	1	2
Rhode Island	3	6	2	1		292	0	1
Connecticut	10	3	11	58	214	181	0	1
Middle Atlantic States:								
New York	67	94	[1] 37	[1] 113	4,317	2,314	3	13
New Jersey	22	29	20	89	1,882	352	4	3
Pennsylvania	52	119			1,818	2,203	7	11
East North Central States:								
Ohio	45	59	194	390	821	2,740	3	10
Indiana	18	19	43	272	134	73	7	12
Illinois	43	61	80	126	575	489	17	9
Michigan	19	24	3	52	1,256	1,098	2	8
Wisconsin	3	8	59	576	387	1,159	3	2
West North Central States:								
Minnesota	13	12	3	1	1,187	40	0	2
Iowa	4	11			11	3	2	1
Missouri	25	32	8	31	233	55	0	1
North Dakota		4			14	9	0	1
South Dakota		6		5	7	19	6	3
Nebraska	8	10		6	24	4	1	2
Kansas	5	18		10	316	344	1	0
South Atlantic States:								
Delaware	4	1		6	13		0	0
Maryland [2]	9	12	18	313	53	17	1	2
District of Columbia	4	11	1	32	4	3	0	2
Virginia [3]	11				380		2	1
West Virginia	13	17	33	335	117	414	1	2
North Carolina	12	18	23	162	600	565	1	2
South Carolina	8	7	434	2,081	269	38	0	0
Georgia [3]	11	8	96	177	81	14	3	1
Florida	12	6	12	14	53	5	0	0
East South Central States:								
Kentucky	12	19	24	788	99	85	2	2
Tennessee	12	10	156	837	80	213	4	3
Alabama [3]	8	18	37	537	66	5	0	1
Mississippi	6	3					0	0
West South Central States:								
Arkansas	7	8	39	252	144	3	1	0
Louisiana	7	29	11	36	104	236	1	0
Oklahoma [4]	7	23	78	422	88	24	3	3
Texas [3]	104	35	290	247	1,209	32	3	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended April 1, 1933, and April 2, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Apr. 1, 1933	Week ended Apr. 2, 1932	Week ended Apr. 1, 1933	Week ended Apr. 2, 1932	Week ended Apr. 1, 1933	Week ended Apr. 2, 1932	Week ended Apr. 1, 1933	Week ended Apr. 2, 1932
Mountain States:								
Montana	1	1	9	3	33	178	1	1
Idaho	----	2	----	1	20	----	0	0
Wyoming	----	1	----	1	2	7	0	1
Colorado	5	5	31	----	12	118	1	3
New Mexico	2	6	16	2	4	53	1	0
Arizona	5	1	----	46	41	3	0	0
Utah [3]	6	2	----	----	1	2	1	0
Pacific States:								
Washington	8	----	----	3	64	523	1	1
Oregon	1	3	31	94	72	214	0	0
California [3]	39	59	52	91	1,272	658	5	3
Total	672	866	1,861	8,429	18,398	15,740	89	112

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Apr. 1, 1933	Week ended Apr. 2, 1932	Week ended Apr. 1, 1933	Week ended Apr. 2, 1932	Week ended Apr. 1, 1933	Week ended Apr. 2, 1932	Week ended Apr. 1, 1933	Week ended Apr. 2, 1932
New England States:								
Maine	0	0	26	31	0	0	1	1
New Hampshire	0	0	19	29	0	0	0	0
Vermont	0	0	11	4	1	4	0	0
Massachusetts	0	2	53	520	0	0	3	1
Rhode Island	0	0	37	52	0	0	0	0
Connecticut	0	0	167	99	1	1	2	0
Middle Atlantic States:								
New York	0	0	1,120	1,527	0	3	3	6
New Jersey	0	1	377	313	1	0	3	3
Pennsylvania	1	2	1,000	1,190	0	0	5	8
East North Central States:								
Ohio	1	1	1,538	557	29	29	2	1
Indiana	1	1	265	199	1	5	3	0
Illinois	0	1	565	335	15	6	4	9
Michigan	0	1	673	492	1	10	4	10
Wisconsin	0	2	124	93	17	3	1	1
West North Central States:								
Minnesota	0	0	107	110	0	3	2	1
Iowa	1	1	31	54	22	11	0	1
Missouri	0	0	87	73	0	2	1	2
North Dakota	1	0	11	14	0	6	0	2
South Dakota	0	0	6	11	0	7	4	2
Nebraska	0	0	20	36	0	11	0	0
Kansas	1	1	67	58	0	14	1	0
South Atlantic States:								
Delaware	0	0	12	20	0	0	0	0
Maryland [2]	0	0	117	132	0	0	4	3
District of Columbia	0	0	17	32	0	0	0	1
Virginia [3]	0	1	43	----	0	----	3	----
West Virginia	0	1	39	44	0	1	3	6
North Carolina	0	0	53	58	1	1	3	3
South Carolina	0	0	3	11	1	0	6	7
Georgia [3]	0	0	8	10	4	0	8	24
Florida	0	1	15	9	0	0	22	2
East South Central States:								
Kentucky	0	0	70	128	1	2	7	11
Tennessee	0	0	39	50	0	41	4	5
Alabama [3]	0	0	14	19	1	18	5	3
Mississippi	0	0	2	17	0	29	7	4
West South Central States:								
Arkansas	0	0	8	3	3	19	2	0
Louisiana	0	0	13	12	1	3	21	14
Oklahoma [4]	1	0	18	28	2	63	5	4
Texas [3]	0	0	86	53	39	37	16	3

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended April 1, 1933, and April 2, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Apr. 1, 1933	Week ended Apr. 2, 1932	Week ended Apr. 1, 1933	Week ended Apr. 2, 1932	Week ended Apr. 1, 1933	Week ended Apr. 2, 1932	Week ended Apr. 1, 1933	Week ended Apr. 2, 1932
Mountain States:								
Montana	1	0	10	36	0	0	0	0
Idaho	0	0	1	6	4	1	3	1
Wyoming	0	0	14	7	0	4	3	1
Colorado	0	0	68	39	6	0	2	1
New Mexico	0	0	8	11	0	0	5	0
Arizona	0	0	21	13	0	0	2	1
Utah [2]	0	0	6	6	0	0	0	0
Pacific States:								
Washington	1	1	53	26	2	25	0	3
Oregon	0	0	21	13	10	9	2	0
California [5]	2	4	167	152	50	15	2	8
Total	11	21	7,320	6,732	213	383	174	153

[1] New York City only.
[2] Week ended Friday.
[3] Typhus fever, week ended Apr. 1, 1933, 13 cases: 1 case in Virginia, 4 cases in Georgia, 4 cases in Alabama, and 4 cases in Texas.
[4] Figures for 1933 are exclusive of Oklahoma City and Tulsa, and for 1932 are exclusive of Tulsa only.
[5] Rocky Mountain spotted fever, week ended Apr. 1, 1933, 1 case in California.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week:

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
January, 1933										
Missouri	13	166	467	1	351		0	444	4	7
February, 1933										
Alabama	4	86	847	24	46	13	2	81	18	10
District of Columbia	3	31	18		14		0	47	0	1
Florida	2	36	694	6	41	3	0	33	0	21
Idaho		5	10		353		0	14	118	2
Kansas	4	37	97		1,051		0	260	5	4
Louisiana	7	65	82	6	135	11	2	28	4	28
Missouri	16	136	116		708			431	2	13
Montana	1	5	706		673		0	84	2	19
Oklahoma [1]	8	56	847	25	80	5	1	85	9	12
Texas	6	280	1,482	219		23	2	214		28
Virginia	11	77	4,296	6	1,680	4	0	166	0	19
Washington	2	26	44		101		2	227	21	7
Wisconsin	4	18	1,106		1,422		5	496	50	6

[1] Exclusive of Oklahoma City and Tulsa.

January, 1933

	Cases
Missouri:	
Chicken pox	393
Dysentery	2
Mumps	175
Septic sore throat	3
Tularaemia	6
Undulant fever	8
Whooping cough	2

February, 1933

	Cases
Actinomycosis:	
Kansas	1
Chicken pox:	
Alabama	91
District of Columbia	139
Florida	107
Idaho	46
Kansas	739
Chicken pox—Continued.	
Louisiana	16
Missouri	344
Montana	116
Oklahoma [1]	34
Virginia	389
Washington	592
Wisconsin	1,922

[1] Exclusive of Oklahoma City and Tulsa.

	Cases
Conjunctivitis:	
Oklahoma [1]	2
Diarrhea and dysentery:	
Virginia	55
Dysentery:	
Florida	3
Oklahoma [1]	1
Food poisoning:	
Montana	2
German measles:	
Kansas	2
Montana	1
Washington	15
Wisconsin	38
Hookworm disease:	
Louisiana	10
Impetigo contagiosa:	
Montana	13
Lethargic encephalitis:	
Alabama	10
Kansas	1
Louisiana	1
Montana	1
Texas	5
Virginia	6
Wisconsin	1
Mumps:	
Alabama	155
Florida	6
Idaho	24
Kansas	730
Louisiana	5
Missouri	259
Montana	42
Oklahoma [1]	53
Washington	107
Wisconsin	377

	Cases
Ophthalmia neonatorum:	
Oklahoma [1]	1
Virginia	1
Paratyphoid fever:	
Kansas	1
Texas	6
Virginia	2
Rabies in animals:	
Louisiana	18
Missouri	4
Washington	4
Scabies:	
Montana	2
Oklahoma [1]	1
Septic sore throat:	
Louisiana	1
Missouri	5
Montana	3
Oklahoma [1]	23
Virginia	27
Washington	4
Tetanus:	
Kansas	1
Louisiana	1
Oklahoma [1]	1
Virginia	2
Trachoma:	
Alabama	1
Oklahoma [1]	4
Virginia	1
Trench mouth:	
Kansas	4
Oklahoma [1]	1
Tularaemia:	
Alabama	3
Florida	1

Tularaemia—Continued.	Cases
Louisiana	4
Oklahoma [1]	3
Virginia	5
Typhus fever:	
Alabama	6
Florida	1
Louisiana	1
Virginia	2
Undulant fever:	
Alabama	1
Kansas	1
Louisiana	1
Missouri	2
Virginia	4
Washington	4
Wisconsin	2
Vincent's angina:	
Montana	1
Vincent's infection:	
Washington	1
Whooping cough:	
Alabama	198
District of Columbia	11
Florida	43
Idaho	18
Kansas	144
Louisiana	91
Missouri	76
Montana	19
Oklahoma [1]	49
Virginia	259
Washington	30
Wisconsin	543

[1] Exclusive of Oklahoma City and Tulsa.

WEEKLY REPORTS FROM CITIES

City reports for week ended March 25, 1933

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	0		0	0	2	2	0	0	1	15	23
New Hampshire:											
Concord	0		0	0	2	1	0	0	0	0	12
Manchester	0		0	0	5	6	0	1	0	0	26
Nashua	0		0	0	0	0	0	0	0	0	
Vermont:											
Barre	0		0	0	0	0	0	0	0	0	1
Burlington	0		0	0	0	2	0	0	0	0	11
Massachusetts:											
Boston	5	2	1	92	18	81	0	9	0	92	227
Fall River	0	1	1	0	5	12	0	3	0	7	37
Springfield	0		0	3	1	15	0	0	0	31	38
Worcester	1	1	0	5	2	19	0	0	0	15	58
Rhode Island:											
Pawtucket	0		0	0	0	2	0	0	0	0	
Providence	1	1	0	0	4	13	0	2	0	31	75
Connecticut:											
Bridgeport	0	3	1	24	2	13	0	3	0	0	30
Hartford	2	1	0	5	5	22	0	1	0	5	40
New Haven	0		0	3	1	8	0	0	0	8	42
New York:											
Buffalo	9		2	41	24	68	0	8	0	36	136
New York	56	36	17	2,359	200	355	0	88	6	109	1,619
Rochester	0		0	4	4	15	0	1	0	13	73
Syracuse	0		0	0	4	37	0	2	0	7	52
New Jersey:											
Camden	1		0	1	4	7	0	1	0	0	31
Newark	1	5	0	521	10	44	0	9	0	29	99
Trenton	0		0	52	7	11	0	1	3	2	35
Pennsylvania:											
Philadelphia	4	13	6	121	45	135	0	20	1	8	462
Pittsburgh	6	2	1	3	12	54	0	7	0	15	144
Reading	1		0	66	1	16	0	1	0	4	23

City reports for week ended March 25, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Ohio:											
Cincinnati	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Cleveland	4	79	1	3	20	244	0	14	0	35	207
Columbus	1	2	2	62	3	11	0	4	0	3	70
Toledo	5	1	1	330	10	110	0	0	0	3	76
Indiana:											
Fort Wayne	9	-------	0	0	3	8	0	0	0	0	21
Indianapolis	4	-------	0	93	6	26	0	3	0	5	-------
South Bend	0	-------	0	3	1	6	0	1	0	2	20
Terre Haute	0	-------	0	0	2	10	0	0	0	2	20
Illinois:											
Chicago	7	4	4	350	62	319	0	23	0	21	-------
Springfield	0	3	0	0	2	4	0	0	0	2	21
Michigan:											
Detroit	15	1	4	621	19	195	0	21	1	66	281
Flint	0	5	1	108	4	11	0	0	0	6	29
Grand Rapids	0	-------	0	6	1	14	0	2	0	28	38
Wisconsin:											
Kenosha	0	-------	0	0	0	7	8	0	0	6	10
Madison	0	-------	-------	133	-------	1	0	-------	0	1	-------
Milwaukee	0	1	1	1	6	32	0	4	0	48	111
Racine	0	-------	0	0	0	3	0	0	0	11	11
Superior	0	-------	0	3	0	1	0	0	0	11	5
Minnesota:											
Duluth	0	-------	0	4	1	0	0	2	0	73	11
Minneapolis	0	-------	3	401	13	48	0	7	0	21	98
St. Paul	0	-------	0	797	7	25	0	4	0	62	79
Iowa:											
Des Moines	2	-------	-------	0	-------	7	0	-------	0	0	32
Sioux City	0	-------	-------	0	-------	3	0	-------	0	3	-------
Waterloo	0	-------	-------	1	-------	2	0	-------	0	1	-------
Missouri:											
Kansas City	2	-------	1	144	14	35	0	17	0	0	86
St. Joseph	0	-------	0	12	7	0	0	1	0	3	24
St. Louis	14	1	-------	21	9	13	0	14	2	1	214
North Dakota:											
Fargo	0	-------	1	1	1	0	0	0	0	0	9
Grand Forks	0	-------	0	0	0	2	0	0	0	0	-------
South Dakota:											
Aberdeen	0	-------	0	1	0	4	0	0	0	0	-------
Nebraska:											
Omaha	3	-------	0	22	4	8	0	4	0	1	51
Kansas:											
Topeka	0	-------	0	135	5	0	0	0	0	0	25
Wichita	0	-------	0	0	3	3	0	0	0	7	24
Delaware:											
Wilmington	0	-------	0	7	1	9	0	1	0	0	27
Maryland:											
Baltimore	5	7	2	5	28	70	0	13	0	14	210
Cumberland	0	-------	0	0	2	0	0	1	0	0	9
Frederick	0	-------	0	0	0	0	0	0	0	0	1
District of Columbia:											
Washington	2	1	1	5	19	15	0	16	1	6	169
Virginia:											
Lynchburg	0	-------	0	4	0	1	0	2	0	3	13
Norfolk	0	-------	0	5	3	7	0	2	0	16	34
Richmond	0	-------	0	0	3	7	0	4	0	0	35
Roanoke	0	-------	0	152	4	1	0	0	0	0	22
West Virginia:											
Charleston	1	1	1	0	3	0	0	0	1	0	14
Huntington	2	-------	-------	7	-------	1	0	-------	0	0	-------
Wheeling	0	-------	0	17	0	7	0	0	0	4	17
North Carolina:											
Raleigh	0	-------	0	0	2	0	0	0	0	1	13
Wilmington	1	-------	0	105	2	0	0	0	0	0	6
Winston-Salem	0	-------	0	2	0	6	0	2	0	2	8
South Carolina:											
Charleston	1	13	0	0	3	0	0	0	0	4	19
Columbia	0	-------	0	0	0	0	0	1	0	0	8
Georgia:											
Atlanta	2	28	1	35	10	0	0	1	0	22	65
Brunswick	0	-------	0	0	0	0	0	0	1	0	3
Savannah	1	110	0	0	7	1	0	2	0	0	32
Florida:											
Miami	0	-------	2	0	1	0	0	0	1	5	29
Tampa	0	1	1	0	1	0	0	1	1	6	25

City reports for week ended March 25, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Kentucky:											
Ashland	0		0	17	0	0	0	0	0	0	
Lexington	0	5	0	4	2	2	0	2	0	0	16
Louisville	1	1	1	0	17	26	0	3	0	1	83
Tennessee:											
Memphis	0		3	15	8	3	0	5	0	10	70
Nashville	0		4	0	3	1	0	2	0	0	61
Alabama:											
Birmingham	0	14	0	4	5	2	0	4	2	5	51
Mobile	0		1	5	4	2	0	4	0	0	24
Montgomery	0			0			0		0	2	
Arkansas:											
Fort Smith	0			1		0	0		0	1	
Little Rock	1		0	18	2	0	0	1	0	0	3
Louisiana:											
New Orleans	9	9	7	11	9	4	0	12	0	1	160
Shreveport	0		0	0	5	3	0	1	0	0	32
Oklahoma:											
Oklahoma City	0	56	0	0	8	0	0	2	0	0	40
Tulsa	0		0	26	0	1	0	0	0	4	
Texas:											
Dallas	4		0		5	8	0	7	1	2	70
Fort Worth	1		2	113	7	3	0	1	1	0	40
Galveston	2		0	1	2	1	0	0	2	0	13
Houston	3		1	10	11	0	2	5	0	0	73
San Antonio	3		6	19	8	1	0	7	2	1	64
Montana:											
Billings	0		0	0	0	0	0	0	0	0	8
Great Falls	0		0	2	1	1	0	0	0	5	13
Helena	0		0	0	0	0	0	0	0	0	2
Missoula	0		0	0	0	0	0	0	0	0	3
Idaho:											
Boise	0		0	20	0	0	2	0	0	0	8
Colorado:											
Denver	1	31	0	5	6	13	0	4	1	2	79
Pueblo	1		0	0	0	2	0	1	0	1	9
New Mexico:											
Albuquerque	1		0	0	0	1	0	4	0	4	12
Arizona:											
Phoenix	0		0	15	1	3	0	4	0	0	
Utah:											
Salt Lake City	0		0	2	2	3	0	1	0	9	37
Nevada:											
Reno	0		0	1	1	0	0	0	0	1	2
Washington:											
Seattle	0			5		8	0		0	1	
Spokane	0			0		0	0		0	0	
Tacoma	0		0	0	3	5	1	0	0	2	21
Oregon:											
Portland	0		1	3	3	14	1	5	0	1	59
Salem	0		0	25	0	0	0	0	0	0	
California:											
Los Angeles	21	17	3	702	8	67	32	21	2	34	288
Sacramento	0	2	1	2	2	0	0	1	1	49	25
San Francisco	3	13	2	1	4	10	0	9	0	74	135

City reports for week ended March 25, 1933—Continued

State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths	
Connecticut			
Bridgeport	1	0	0
New York:			
New York	2	2	0
New Jersey:			
Newark	1	0	0
Pennsylvania:			
Philadelphia	1	0	0
Pittsburgh	2	1	0
Indiana:			
Indianapolis	9	0	0
Illinois:			
Chicago	23	8	0
Springfield	1	0	0
Michigan:			
Detroit	1	0	0
Minnesota:			
St. Paul	1	0	0
Iowa:			
Des Moines	1		0
Sioux City	1		0
Missouri:			
St. Joseph	0	1	1
District of Columbia:			
Washington	1	0	0
Virginia:			
Norfolk	1	0	0
Richmond	0	0	1
Tennessee:			
Memphis	1	0	0
Louisiana:			
New Orleans	1	1	0
Colorado:			
Denver	0	1	0
Washington:			
Seattle	1		0
California:			
Los Angeles	1	1	2
San Francisco	2	1	0

Lethargic encephalitis.—Cases: Buffalo, 1; New York, 2; Chicago, 1; Birmingham, 1.
Pellagra.—Cases: Washington, 1; Savannah, 2; Los Angeles, 1.
Rabies (in man): 1 case and 1 death at New Orleans.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Two weeks ended March 11, 1933.—The Department of Pensions and National Health of Canada reports cases of certain communicable diseases for the two weeks ended March 11, 1933, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba [1]	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				2						2
Chicken pox		10	5	428	615	38	67	5	152	1,320
Diphtheria		1	2	47	30	3	15			98
Dysentery					1					1
Erysipelas				13	13	4	1	1	2	34
Influenza		56		14	97	1	5		13	186
Measles	5	21	13	390	658		18	6	25	1,139
Mumps		7			581	30	7		42	667
Paratyphoid fever					6					6
Pneumonia		6			20		26		11	63
Poliomyelitis				2						2
Scarlet fever		22	11	179	158	19	38	5	25	457
Smallpox					3		4			7
Trachoma					1				2	3
Tuberculosis	1	5	13	133	75	1	44	6	59	337
Typhoid fever			2	21	9	1			1	37
Undulant fever					13		1			14
Whooping cough				345	260	14	43	11	48	721

[1] Report from Manitoba for week ended Mar. 4 not included.

Ontario Province—Communicable diseases—Four weeks ended February 25, 1933.—The Department of Health of the Province of Ontario, Canada, reports certain communicable diseases for the four weeks ended February 25, 1933, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	4	2	Pneumonia		167
Chicken pox	1,258		Puerperal septicemia		1
Diphtheria	50	2	Scarlet fever	295	3
Erysipelas	4		Septic sore throat	33	2
German measles	8		Syphilis	81	
Gonorrhea	114		Trachoma	6	
Influenza	1,005	26	Trench mouth	3	
Lethargic encephalitis	2	2	Tularaemia	1	
Measles	1,489	5	Typhoid fever	19	1
Mumps	891		Undulant fever	5	
Paratyphoid fever	6		Whooping cough	437	1

CUBA

Habana—Communicable diseases—Four weeks ended March 25, 1933.—During the four weeks ended March 25, 1933, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	8	5	Tuberculosis	13	3
Malaria [1]	6	0	Typhoid fever [1]	14	3
Scarlet fever	1				

[1] Many of these cases are from parts of the island outside of Habana.

CZECHOSLOVAKIA

Communicable diseases—January, 1933.—During the month of January, 1933, certain communicable diseases were reported in Czechoslovakia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	1		Malaria	1	
Cerebrospinal meningitis	8	4	Paratyphoid fever	8	2
Chicken pox	328	1	Poliomyelitis	11	3
Diphtheria	3,293	187	Puerperal fever	42	14
Dysentery	5		Scarlet fever	1,985	23
Influenza	23,372	179	Trachoma	81	
Lethargic encephalitis	3	2	Typhoid fever	411	42

YUGOSLAVIA

Communicable diseases—February, 1933.—During the month of February, 1933, certain communicable diseases were reported in Yugoslavia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	49	8	Poliomyelitis	9	2
Cerebrospinal meningitis	14	5	Sepsis	11	3
Diphtheria	789	118	Scarlet fever	267	15
Dysentery	267	3	Tetanus	12	9
Erysipelas	147	4	Typhoid fever	269	56
Measles	918	13	Typhus fever	184	7
Paratyphoid fever	15	1			

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

(NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for March 31, 1933, pp. 334–345. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued April 28, 1933, and thereafter, at least for the time being, in the issue published on the last Friday of each month.)

Cholera

Philippine Islands.—During the week ended April 1, 1933, 2 cases of cholera with 2 deaths were reported at Ormoc, Leyte Province, Philippine Islands.

Plague

Ecuador.—During the month of March, 1933, 3 cases of plague were reported near Guamote, Ecuador.

Yellow Fever

Senegal—Bakel.—On April 1, 1933, a case of yellow fever was reported at Bakel, Senegal.

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UNITED STATES PUBLIC HEALTH SERVICE

HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst. Surg. Gen. R. C. WILLIAMS, *Chief of Division*

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They contain: (1) Current information of the prevalence and geographic distribution of preventable diseases in the United States in so far as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other communicable diseases throughout the world. (2) Articles relating to the cause, prevention, or control of disease. (3) Other pertinent information regarding sanitation and the conservation of the public health.

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PUBLIC HEALTH REPORTS

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INACTIVATION OF ANTISTREPTOCOCCUS BACTERIOPHAGE BY ANIMAL FLUIDS

By ALICE C. EVANS, *Senior Bacteriologist, United States Public Health Service*

INTRODUCTION

If bacteriophage could destroy bacteria *in vivo* as it does *in vitro*, it would offer a remarkable cure for infections with those bacteria for which an active phage has been found. With this intriguing theoretic possibility of the value of phage in the treatment of disease, many trials have been made of its therapeutic properties in a great variety of human diseases. While the nature of the trials has been usually that of an experiment without controls, the recovery of the patient has been often ascribed to the therapeutic virtues of the phage. In some of the trials there appears to be good evidence that beneficial results followed the use of phage. An example is MacNeal and Frisbee's recent report of seven recoveries out of 15 cases of staphylococcus bacteremia treated with phage, whereas such infections are known to result generally in a higher average percentage of mortality. On the whole, however, the results of the use of phage as a therapeutic agent have been disappointing. Certainly they have been less successful than test tube experiments seemed to promise. A review of the literature led Larkum in his recent summary of the information on the use of phage in clinical medicine to state that if its effectiveness is dependent on lysis *in vivo*, its application is limited to enteric infections, with some slight hope for kidney and bladder conditions. To that disillusioned view it must be added that even in enteric infections the results with phage have been worthless in the opinion of some investigators who have tried it.

There are two kinds of experiments which should enlighten the use of bacteriophage in human disease: First, its efficacy can be determined in the treatment of experimentally infected animals, with adequate controls; and second, the effect on bacteriophage of the various fluids and cells with which it comes into contact when introduced into the body can be determined *in vitro*.

REVIEW OF THE LITERATURE

With only a few dissenting reports, there is agreement in respect to the experiments in which phage has been used in the treatment of experimentally infected animals. In reviewing the results ob-

tained, Bronfenbrenner (1928) states that it has almost universally failed to influence the course of the disease. The work done subsequently to his review agrees generally with that statement.

The more recently reported results may be summarized briefly. Flu could not save guinea pigs inoculated with minimal lethal doses of plague bacilli by treatment with phage simultaneously, nor by administering the phage from one to three days after the inoculation. White rats also failed to show protection when injected with phage immediately after injection with the plague bacillus.

After a search for a phage highly active against the agent of a current epidemic of plague, Naidu and Avari found a strain which caused lysis in broth cultures in less than two hours. Yet it was of no benefit when injected into rabbits experimentally infected with the sensitive plague organism. On the contrary, the phage lowered the percentage of recoveries when injected together with an antiserum which possessed the property of reducing the mortality among experimentally infected rabbits. Thirty-three human patients were treated with this highly active strain of phage and every one died.

Eliava found that phage specific for the Shiga bacillus, staphylococcus, or colon bacillus had no therapeutic effect in animals; and Cowles and Hale reported that phage injected into the body appeared to have a detrimental, rather than a beneficial effect in experimental anthrax in white mice.

On the contrary, Walker reported a marked reduction in the mortality of mice when bacteriophage was injected into the peritoneal cavity simultaneously with the colon bacillus. Later he carried out experiments with phage in the treatment of staphylococcus and streptococcus infections. The cocci were injected intracutaneously and the specific phage injected previously or simultaneously with the culture had no effect on the lesion. Likewise, intravenous injection of phage subsequent to intracutaneous injection of staphylococci had no observable effect on the lesions. It was only when the phage was mixed with the staphylococci previous to injection that a beneficial effect was observed.

In a recent publication the conclusions of MacNeal, Frisbee, and Slavkin in regard to the beneficial effects of bacteriophage in experimental infections disagree with those of the majority of investigators. They studied the multiplication of staphylococci in experimentally infected rabbits treated with bacteriophage and in control animals. They reported that one immediate effect of intravenous injection of phage in bacteremia is to favor more rapid phagocytosis of the bacteria which are circulating in the blood. They also reported that the phage tends to restrain the further growth of the bacteria which have lodged in the internal organs, and that it favors the more rapid and efficient intracellular digestion of the phagocyted bacteria. These

investigators, however, apparently did not carry out experiments to compare the mortality in phage-treated and in control animals, all of their animals having been killed to follow the progress of the disappearance of the cocci. In the same number of the same journal containing the report of MacNeal, Frisbee, and Slavkin, a diametrically opposite conclusion is reached by Krueger, Lich, and Schulze, who also studied the multiplication of staphylococci in experimentally infected rabbits. Their work is referred to again further on.

In agreement with the majority of investigators who tested the efficacy of bacteriophage in controlled animal experiments are the results of Dresel and Lewis, who studied the behavior of bacteriophage in tissue cultures with mouse typhoid bacilli. Cultures with phage were compared with cultures without phage in susceptible mouse tissue and in resistant chicken tissue. In neither case could any difference in behavior be observed in the multiplication of the bacilli in cultures with or without phage.

A more detailed review of the limited experimentation with antistreptococcus bacteriophage is in order. It was used therapeutically in human cases of streptococcus infection reported by McKinley, by Dutton, and by Raiga. It appears that both McKinley and Raiga treated a single case. Dutton treated five cases, but apparently he used a very weak phage. Hence the statement can be made that the treatment of human cases of streptococcus infection with specific bacteriophage has never received an adequate trial. The negative results obtained in animal experiments offer no hope that such treatment would be beneficial.

Clark and Clark infected rabbits with a streptococcus, isolated from spontaneous rabbit infection, which was lysed by their strain of phage in high titer. Treatment with phage was given either before or after the bacterial inoculations. It was given *per os*, or by intraperitoneal or intravenous injections. In no case did the treated animals do better than the untreated controls. On the contrary, in every instance in which a large amount of the phage was used, the treated animals died before the controls.

Colvin also studied the effect of bacteriophage on streptococcus infection in the natural host of the particular streptococcus strain used, namely, in lymphadenitis in guinea pigs. Treatment with a phage highly virulent for this streptococcus revealed no therapeutic value. On the contrary, as in the Clarks' experiments, there was evidence that it was not entirely harmless. The writer's experiments reported in detail further on are in complete agreement with those of the Clarks and those of Colvin in showing that the therapeutic use of antistreptococcus phage did not ameliorate experimental streptococcus infections, and some of the data indicate that the disease was more severe in animals injected with the phage.

From the foregoing review of the failures to cure experimental infectious diseases, it is evident that there is something in the body which inhibits bacteriophagy. Opinions are contradictory, however, as to what the inhibiting agent may be. Several writers (Bruynoghe and Maisin; Applebaum and MacNeal; Colvin) have noted the inhibitory action of pus, and some (Bruynoghe and Maisin; Eliava) believe that the leucocytes are responsible for the inactivation. On the contrary, Bier and Cunha assert that leucocytes do not inhibit the action of phage. There are some writers who believe that the leucocytes are responsible for the disappearance of bacteriophage from the blood. Burnet subscribes to that opinion in his recent review. Some writers (Gratia and Jaumain; Gratia and Mutsaars; Cowles and Hale; Applebaum and MacNeal; Colvin; Riding) have reported that blood serum is inhibitory. Others (Bruynoghe and Maisin; Eliava) have reported that it is not inhibitory. Krueger, Lich, and Schulze recently reported that phage injected into rabbits simultaneously with virulent staphylococci failed to prevent the multiplication of the staphylococci. The curves showing the bacterial content of the blood in the treated animals and in the controls exhibited no significant differences. These investigators believe that the inhibition of the phage is due to its adsorption by red blood cells, thus agreeing with Arloing, Langeron, and Sempé, whereas other investigators (Eliava; Applebaum and MacNeal) believe that red blood cells are not inhibitory.

Until recently scant attention has been paid to the possible inhibitory action of fluids other than blood or pus with which bacteriophage becomes diluted when used as a therapeutic agent. Calalb reported, however, that bile inhibits the action of bacteriophages active against typhoid and colon bacilli and staphylococci. (This work has been referred to in the literature as Hauduroy's.) In a recent paper, which was published after the completion of the experiments here reported, Colvin states that serum and pus inhibit the action of bacteriophage, and to a less degree ascitic fluid, cerebrospinal fluid, and urine are also inhibitory.

Colvin emphasizes, as did Gratia and Jaumain, that different bacterial species vary greatly in their response to the inhibitory action of body fluids on phage. He found that different races of phage also differ in their response to inhibitory agents, and that even different samples of a given fluid may differ in inhibitory activity.

In test tube experiments there are three variables concerned in the inactivation of bacteriophage—the strain of bacterium, the race of phage, and the body fluid. In animal experiments even greater variability is conceivable. The results of the experiments here reported which are limited to a single race of bacteriophage and to two strains of streptococci, can not be assumed to apply equally to all other races

of phage and all other bacteria. They do, however, offer an explanation why bacteriophage has been so disappointing as a therapeutic agent.

EXPERIMENTAL

The experiments recorded in this paper are concerned with the therapeutic action of antistreptococcus bacteriophage in experimentally infected animals, and its lytic action in the presence of animal fluids and cells *in vitro*.

For the test tube experiments the strain of streptococcus used was that known as Birkhaug E_1, originally from a case of erysipelas. For the animal inoculation experiments a highly virulent strain of streptococcus was used. It was received from the late Dr. F. B. Jennings, of Johns Hopkins Medical School, as one of his virulent cultures derived from a nonvirulent culture by selection of dissociating colonies. The Jennings strain was usually lethal to white mice in 1×10^{-8} c c of 24-hour broth culture, which contained only a few units of streptococci, the unit being a single coccus, a pair, or a chain from which a colony would develop on blood agar.

The bacteriophage used was the strain originally obtained from sludge by Clark and Clark. It was received through the courtesy of Dr. Gregory Shwartzman, of Mount Sinai Hospital, New York City. For general purposes the phage was propagated on the erysipelas streptococcus. The filtrates usually contained approximately 10^{10} particles of phage active for the homologous strain. When tested on the Jennings strain the titer was lower, lysing the culture in dilutions of 1 to 10^6 c c but not in higher dilutions. For some of the experiments in mice, and all the experiments in rabbits, a substrain of the phage was used which was produced by growth for 20 culture generations on the Jennings streptococcus. This treatment raised its titer for the Jennings streptococcus to 10^9.

EXPERIMENTS IN VIVO

Several sets of mouse inoculations with streptococcus and bacteriophage gave consistent results, with no evidence that the phage ameliorated the disease. In all the experiments the dose was 0.5 c c of undiluted phage and 0.5 c c of streptococcus culture, the dilution varying in the several experiments. In the preliminary experiment the inoculating dose was diluted to 1×10^{-5} c c. For 3 mice the phage and streptococci were incubated for 1 hour before inoculation; for 3 mice the phage and streptococci were injected simultaneously; and for 3 mice the phage was injected 1 hour after the streptococci. All nine mice died on the second or third day of the experiment, and streptococci were cultured from the heart blood of all.

TABLE 1.—*Protocol of an experiment showing that bacteriophage does not protect mice inoculated with approximately five minimal lethal doses of sensitive streptococci*

Inoculum	Mouse 1 of group	Mouse 2 of group	Mouse 3 of group
Controls Culture + broth	Died, 52 hours	Died, 52 hours	Died, 72 hours
Group I Culture + phage not incubated	Died, 46 hours	Died, 46 hours	Died, 52 hours
Group II Culture + phage incubated together 1 hour	Died, 38 hours	Died, [illegible]5 hours	Died, 110 hours.
Group III Culture + phage incubated together 2 hours	Died, 4[illegible] hours	Died, 52 hours	Died, 62 hours

Hemolytic streptococci were recovered from the heart blood of all the mice

Another experiment was carried out using broth culture diluted to 1 part in 10^7. (See Table 1 for the protocol.) The inoculum of 0.5 c c therefore contained approximately five minimal lethal doses. Three mice of 1 group were injected with culture and phage simultaneously; 3 mice of another group were injected with culture and phage which had been incubated together for 1 hour; 3 mice of another group were injected with culture and phage which had been incubated together for 2 hours; and a control group of 3 mice received culture without phage Plantings on blood agar plates showed that the inoculum of the 3 control mice and of the group receiving the culture and phage without incubation contained approximately 5 units of streptococci; plantings made just before inoculation of the mixtures of culture and phage showed that lysis of the streptococci had not occurred during the 1 or 2 hours of incubation, nor had multiplication of streptococci occurred. As in the first experiment the mice all died, and hemolytic streptococci were cultivated from the heart blood of all.

TABLE 2.—*Protocol of an experiment showing that bacteriophage does not protect mice inoculated with approximately one unit of sensitive streptococci*

Inoculum	Mouse 1 of group	Mouse 2 of group	Mouse 3 of group
Controls Culture + broth	Survived	Survived	Survived
Group I Culture + phage, not incubated	Died, 52 hours [1]	Died, 62 hours [1]	Died, 89 hours [2]
Group II Culture + phage incubated together 1½ hours	Died, 17 hours [1]	Died, 52 hours [1]	Died, 64 hours [1]
Group III Culture + phage incubated together 3 hours	Died, 46 hours [1]	Died, 62 hours [1]	Died, 100 hours. [1]

[1] Pure culture of streptococcus from the heart blood
[2] No growth in culture planted with heart blood

The third experiment was similar to the second, except that the streptococcus culture was diluted still higher, to 1 part in 10^8. As it happened, the dilution was slightly too high, and none of the three control mice died. Yet every one of the nine mice receiving bacteriophage died, and streptococci were cultured from the heart blood of all except one. (See Table 2.) In this experiment the streptococcus culture was diluted so high that the inoculum would contain only a

very few units. By chance it might occasionally contain no streptococci. It is possible that the three control mice may not have received any streptococci. The protocol suggests, however, that in this experiment as in those of the Clarks and of Colvin, the phage was harmful, stimulating a sublethal dose of streptococci to produce a fatal infection.

Two further experiments were carried out to demonstrate the possible stimulation of a sublethal dose of the streptococcus by bacteriophage In each experiment there were three control mice which received streptococci alone, and three mice which received streptococci and phage simultaneously For one experiment the broth culture was diluted to 1 part in 10^8. One of the 3 controls and 1 of the 3 mice which received phage survived In the other experiment the broth culture was diluted to 1 part in 5×10^7. One of the 3 control mice survived, but all 3 mice receiving phage died. Summarizing the 3 experiments in which the inoculum contained only a few minimal lethal doses, with the possibility that it might not contain a single unit of streptococci, 5 out of 9 control mice survived, whereas only 1 out of 15 mice receiving phage survived. These limited figures can not be taken as proof that the phage was harmful, but they demonstrate emphatically that it was of no benefit under the conditions of these experiments.

The possibility of a therapeutic property in the antistreptococcus phage was tested in rabbits also. The infecting dose of streptococcus in these experiments was so adjusted that the majority, but not all, of the control rabbits not receiving phage would die. Thus the experiment would not only demonstrate the possible beneficial effect of the phage, but also it would demonstrate any possible harmful effect. Two similar experiments were carried out, in each of which there were nine rabbits. Three had been injected intravenously with 2 c c of phage 3 days previously, 3 were injected with 2 c c of phage simultaneously with the infecting dose of streptococcus, and 3 without phage treatment served as controls. The infecting dose was 1 c c of the 1 in 10^3 dilution of a 24-hour broth culture injected intravenously. (In the course of another experiment on another phase of the bacteriophage problem not reported in this paper, it had been determined that the mentioned dose would kill the majority, but not all, of the rabbits.) One of the control rabbits died with an intercurrent infection. It is eliminated in the consideration of the results.

The protocols of the two experiments are combined in Table 3. In so far as can be judged from these limited data, the mortality rate was not appreciably influenced by the presence of phage in the body. The slight differences, which happen to favor the phage-treated rabbits, are within the limits of error.

TABLE 3.—*Combined protocols of two experiments showing that bacteriophage [does] not influence the death rate of rabbits inoculated with sensitive streptococci*

Treatment	Date of inoculation	Rabbit 1 of group	Rabbit 2 of group	Rabbit 3 of group	Total number of rabbits	Died	Survived
None (controls)	1933 Jan. 7	Dead, ninth day[1]	Survived	Dead, sixth day[1]			
	Jan. 19	Dead twelfth day[1]	Dead eleventh day	Survived	[3]5	3	2
Group I 2 cc phage 3 days previously	Jan. 7	Dead, fourth day[1]	Dead, fifth day[1]	Dead, sixth day[1]			
	Jan. 19	Survived	Survived	Survived	6	3	3
Group II 2 cc phage simultaneously	Jan. 7	Dead, third day[1]	do	do			
	Jan. 19	Survived	Dead, seventh day[1]	Dead, sixth day[1]	6	3	3

[1] Pure culture of streptococcus from the heart blood.
[2] An extraneous organism was cultured from the heart blood.
[3] One control rabbit died of intercurrent infection.

Although the mortality rate shows no evidence that the phage was harmful, there was evidence that the disease was unusually violent in those rabbits treated with phage which succumbed to the infection. Whereas the death of the control rabbits which received no phage occurred on the sixth to twelfth days, those treated with phage died earlier, from the third to seventh days. The control rabbits which died on the sixth and ninth days showed gross lesions only in the lungs. In the control rabbit which died on the twelfth day, in addition to the lung lesions, pus was found in the pleural and peritoneal cavities. In some of the phage-treated rabbits there were other lesions indicating a more violent disease. The one which died on the third day had been bleeding from the nose, and the liver was of an abnormally bright red color; in two rabbits (dying on the fifth and sixth days) there were necrotic areas on the liver; and in two rabbits (dying on the fifth and sixth days) a ruptured stomach or intestine was found.

The evidence here given that bacteriophage treatment may be harmful to experimentally infected mice and rabbits is in agreement with the results of other workers who reported a harmful effect of phage. (See the review of the literature.) In speculating why the disease should be more severe in the presence of phage, the observed stimulation of bacterial growth *in vitro* in the presence of phage under certain conditions comes to mind. Hetler and Bronfenbrenner found that 4 per cent agar or 50 per cent gelatin in culture medium prevents lysis by bacteriophage, and that on these media the bacteria grow more vigorously in the presence of phage. I have observed that strains of streptococci that are only slightly sensitive to bacteriophage sometimes grow more vigorously in broth cultures in the presence of phage.

The following experiment was carried out to determine the fate of the phage after introduction into the blood stream. A rabbit weighing approximately 2 kg was injected intravenously with 2 c c of a sample of phage with a titer of 10^9 Samples of blood taken from the ear vein after 2 hours, and after 1, 2, and 3 days, were tested for the presence of phage. The most successful method found for its demonstration was to allow 1 drop of blood to flow from the ear vein into a tube of broth A larger quantity of blood in the broth inhibited the action of the phage. (The inhibitory action of body fluids is considered further on) The broth containing the blood was inoculated with the streptococcus and incubated. On the following day, if there was any question whether partial lysis had occurred, the culture was filtered and the filtrate was tested for phage. Thus it was demonstrated in the blood samples taken at 2 hours, 1 and 2 days, but it had disappeared from the blood when the sample was taken 3 days after its injection

The presence of phage in the rabbit's body three days after injection was of particular interest in connection with the experiment recorded in Table 3. Hence the rabbit was killed after the 3-day sample of blood had been taken, and the liver and spleen were examined for phage To demonstrate the phage, a portion of the organ was crushed to a pulp in a mortar, then approximately 2 parts of broth were added and, after mixing, a drop of the emulsion was added to a tube of broth. The subsequent procedure was the same as for the demonstration of phage in the blood. A larger quantity of emulsion added to the broth gave negative results, due to its inhibitory action on the phage By the described method, phage could be demonstrated in the spleen, but not in the liver. These results are in agreement with those of Appelmans, who found that phage injected into the blood stream of rabbits was retained in the spleen after it had disappeared from the other organs and from the blood.

EXPERIMENTS IN VITRO

The results of the foregoing experiments are in agreement with the results of other investigators in showing that phage is rendered ineffective when introduced into the animal body An attempt was therefore made to determine what constituents of the blood cause the inactivation and what other body fluids have the same effect

In these experiments the test for phage was always made in broth culture, because the plate method for the demonstration of antistreptococcus phage has been found to be less delicate. The diluent of the test substances was broth with a hydrogen ion concentration of pH 7.6. Incubation was at 37° C. The phage was always diluted to contain approximately 10^4 particles per c c of test substance. (Phage containing 10^{10} particles per c c was diluted to 1 part in 10^4, and 2

drops of this dilution were added to 10 c c of test substance.). The substance under consideration was tested undiluted and diluted to varying degrees with broth. For every test made, a control tube without phage demonstrated any possible inhibition of the growth of the streptococcus by the test substance itself. Control tubes of inoculated broth without and with phage demonstrated the multiplication of the streptococci in the one and the lysis by phage in an inert medium in the other. (A clear medium in a tube inoculated with streptococci and bacteriophage signifies more than inhibition of growth. It signifies lysis, for multiplication of the streptococci, producing turbidity, precedes lysis.) Streptococcus inoculations were always with one drop of 2-hour culture which had been planted heavily enough to develop faint turbidity during the short incubation. The cultures in the test substance with and without phage were incubated 24 hours, then were agitated to make uniform suspensions, and a loopful of each was spread on blood agar to demonstrate the relative number of streptococci in the corresponding tubes with and without phage. The blood agar plates were marked to divide them into halves; one-half was streaked with a loopful of the culture containing phage and the other half was streaked with the corresponding culture without phage. After the plates had been incubated 24 hours readings were made.

TABLE 4.—*Sample protocol of an experiment to show the inhibitory action of various substances on bacteriophage*

Test substance	Bacteriophage	Dilution of test substance			
		Undiluted	1.2	1.5	1:10
Broth	None	Myriads of colonies.	------	------	
	Present	Many colonies	------	------	
Pus	None	Alike Myriads of colonies	Myriads of colonies	Myriads of colonies	Myriads of colonies
	Present		Colonies in ragged patches	28 colonies	2 colonies.
Washed cells from pus.	None	Myriads of colonies	Myriads of colonies	------	
	Present	1 colony	About 80 colonies	------	
Ascitic fluid	None	Alike. Myriads of colonies	Alike Myriads of colonies	Myriads of colonies	Myriads of colonies
	Present			About 160 colonies	About 160 colonies
Urine	None	Myriads of colonies	Myriads of colonies.	Myriads of colonies	
	Present	Colonies in ragged patches.	Sterile	13 colonies	

A sample protocol is given in Table 4. In recording these data each hemolyzed disk on the blood agar plates was counted as a colony, although on the plates streaked with culture containing active phage the streptococcal growth which produced the hemolysis might have disappeared by the time the plates were examined.

In the experiments recorded in Table 4 the broth control culture in which lysis had occurred was clear, yet the blood agar streaked

with it developed many isolated colonies—many more than developed as a rule from broth cultures in which lysis had taken place. Nevertheless, the contrast between the isolated colonies on the one half of the plate and the myriads of colonies on the other half gave a striking demonstration of the results of bacteriophagy. Other plate cultures recorded in Table 4 which developed colonies varying in number from 0 to 160 gave typical pictures of the results of lysis in inert media.

Partial inhibition of bacteriophagy by the test substance was sometimes demonstrated in the blood agar cultures by a reduced number of colonies evenly distributed; at other times by a patched appearance of the plates, with irregular areas of the plate hemolyzed, interspersed with irregular nonhemolyzed areas where no growth had taken place. In the experiment recorded in Table 4, partial inhibition occurred in the culture with phage added to pus diluted 1 to 2, and in the culture with phage added to undiluted urine.

When the blood agar streaked with culture to which phage had been added developed as many colonies as the control half of the plate streaked with culture without phage, the result was considered as complete inhibition.

According to these interpretations, Table 4 shows that in undiluted pus the action of phage was completely inhibited; in the 1 to 2 dilution there was partial inhibition; and in higher dilutions the pus exerted no inhibitory influence. The washed pus cells did not inhibit bacteriophagy. It was completely inhibited by ascitic fluid undiluted or in the 1 to 2 dilution, but not in higher dilutions. Undiluted urine partially inhibited it, but there was no action in dilutions of 1 to 2 and higher.

Repeated tests were carried out with various substances, using the technique and interpretations described above. For every substance investigated, the tests were carried out on at least two different occasions; and if the results were then uncertain, there was further repetition. The results of the tests are summarized in Table 5.

The blood and pus and their respective constituents were from rabbits, the pus being produced by injection of aleuronat into the pleural cavity; the ascitic fluid, urine, and saliva were of human origin; and the bile and milk were of bovine origin. The gastric juice was obtained from a dog under anæsthesia, through a canula inserted into the duodenum just beneath the pylorus.[1] A small amount of water was injected into the stomach to stimulate the flow of juice, which was thus diluted to approximately 1 part in 2.

The blood and pus cells were washed several times in saline solution. For the whole cells the final suspension was in broth. The suspensions were agitated at the beginning of the experiments, but

[1] The writer is indebted to Dr. S. M. Rosenthal, of the National Institute of Health, for obtaining the gastric juice.

not during the incubation period. For the hemolyzed blood cells, distilled water was added to the washed cells. For the autolyzed pus cells the washed cells were suspended in saline solution and incubated for several hours until autolysis occurred. The final suspensions of whole cells, and also of cells to be lysed, were made up to a density approximately the same as that in the blood or pus from which they were derived.

The samples of urine, saliva, and gastric juice were sterilized by passing through a Berkefeld N filter, the saliva having been first mixed with an equal quantity of broth and centrifugated to remove cellular material. The bile was sterilized by heat.

TABLE 5.—*Summary of the influence of various body fluids and cells on bacteriophage*

Test substance	Dilution			
	Undiluted	1:2	1:5	1:10
Blood	Complete inhibition		Partial inhibition	No definite inhibition
Blood serum	do		do	Do.
Washed blood cells.	Different tests gave none, or partial inhibition			
Hemolyzed blood cells.	Complete or partial inhibition.	Partial inhibition	No inhibition	
Pus	Complete inhibition	do	do	
Pus fluid	do	do	do	
Washed pus cells	No inhibition			
Autolyzed pus cells.	(Test substance inhibits growth of streptococci.)	(Test substance inhibits growth of streptococci.)	(Test substance partially inhibits growth of streptococci.)	Different tests gave complete, or partial, or no inhibition
Ascitic fluid	Complete inhibition	Complete inhibition	Partial inhibition	No inhibition
Bile	(Test substance inhibits growth of streptococci.)	Complete or partial inhibition.	do	(See discussion in text.)
Gastric juice			do	No inhibition.
Urine	(1)	No inhibition	No inhibition	
Saliva		Complete inhibition	Partial inhibition	

1 Undiluted urine sometimes inhibits the growth of the streptococci. If it does permit growth, there is partial inhibition of the bacteriophage.

According to Table 5 all the undiluted fluids tested, with the exception of urine, completely inhibited the action of bacteriophage. The gastric juice which had been diluted with an approximately equal part of water did not permit growth of the streptococcus; the 1 to 5 dilution partially inhibited the action of the phage. The diminished action of diluted blood, pus, serum, and ascitic fluid is of no practical interest; for when phage comes in contact with these fluids in the body, they are always in full strength. On the other hand, the diminished activity of diluted saliva, gastric juice, and bile permit a hope to be entertained that phage might be effective in the treatment of infections of the alimentary tract; and the partial inhibition of bacteriophagy by undiluted urine suggests that bladder instillations of phage might not be without effect.

There is no assurance, however, that phage could act under the conditions within the mouth or intestine; for in addition to the defi-

nite inactivation by undiluted or slightly diluted body fluids, unknown factors cause an irregular and uncertain behavior of phage even in test-tube experiments. This irregular behavior is termed the "zone phenomenon." It may be observed frequently when falling dilutions of phage are inoculated with a constant dose of the streptococcus, as in the titration of a sample of phage for potency. In the series of tubes containing phage, sometimes a single tube remains turbid. The turbid tube may be anywhere in the series. Sometimes the zone includes several tubes, which may be in the lowest dilutions or anywhere else in the series. Certain batches of phage exhibit the zone phenomenon with considerable regularity; other batches, prepared in the same manner, may be titrated repeatedly without showing it.

Since bile is always more or less diluted in the intestines, it was of interest to determine its action in a series of falling dilutions, with a constant amount of phage. The tests were carried out in the same manner as those already described, with the series of tubes containing bile in dilutions of 1 in 2, 1 in 5, 1 in 10, 1 in 20, 1 in 50, 1 in 100, etc. The series began with the 1 in 2 dilution because the undiluted bile itself inhibited the multiplication of the streptococcus. In the 1 in 2 dilution the phage was completely or partially inactivated; in the 1 in 5 dilution there was usually a partial inhibition; in the 1 in 10 dilution there was usually no evident inhibition. In several experiments the series was carried to high dilutions. There always appeared one zone, or sometimes two zones, of one or two turbid tubes in which the phage failed to act in the high dilutions of bile. These zones occurred anywhere in the series and on several occasions included the tube containing the 1 in 5,000 dilution.

TABLE 6.—*The zone phenomenon as exhibited in titrations to show the action of bile on bacteriophage*

Dilution of bile	Date tested	
	June 4, 1932	June 12, 1932
1 to 2	Complete inhibition	Almost complete inhibition.
1 to 5	Partial inhibition	Do.
1 to 10	No inhibition	Do.
1 to 20	Slight (?) inhibition	Slight (?) inhibition.
1 to 50	Partial inhibition	Almost complete inhibition.
1 to 100	do	Partial inhibition.
1 to 200	No inhibition	No inhibition.
1 to 500	do	Do.
1 to 1,000	Partial inhibition	Do.
1 to 2,000	Complete inhibition	Do.
1 to 5,000		Partial inhibition.
1 to 10,000		No inhibition.

To illustrate the zone phenomenon the results of two series of tests with the same sample of bile are given in Table 6. Since the zone phenomenon frequently occurs in a series of tubes of broth with falling dilutions of phage, that which occurred so commonly in the series

with constant quantities of phage and falling dilutions of bile can not be ascribed to a specific action of the bile on the phage, although it occurred more frequently, and involved more tubes of the series when bile was present than in titrations in broth. The important point in considering the activity of phage in the intestines is that, in addition to the definite inhibition in low dilutions of bile, the phage is very unstable and is easily and frequently inactivated by slight changes in conditions, for unexplainable reasons.

It appears that Calalb must have encountered the zone phenomenon without recognizing it as such; for in reporting that bile inactivates phage, he states that high dilutions were as effective as low dilutions.

The data given in Table 5 show that it is the fluid constituents of blood and pus which contain the most active inhibitory agent, the washed cells being almost or quite inert under the conditions of these experiments. In this respect the data presented here are at variance with the opinion commonly held, and supported by the reports of some investigators, that leucocytes are the active inhibitory constituent of blood. (See the review of the literature.) On the other hand, the lysed blood cells inhibited bacteriophagy completely or partially. Incidentally the complete inhibition of growth of the streptococcus by the autolyzed pus cells is of interest. There was partial inhibition of the growth of the streptococcus even in the 1 in 5 dilution of an autolyzed suspension of cells which before dilution was of approximately the same density as that of pus. It was therefore impossible to determine the effect of the autolyzed pus cells on bacteriophage in dilutions lower than 1 in 10. In this dilution the results were irregular, showing complete, or partial, or no inhibition.

SUMMARY

Antistreptococcus bacteriophage injected into mice inoculated with a minimal lethal dose of sensitive culture did not palliate the infection when the two doses were given simultaneously, nor when the phage and streptococci were incubated together previous to inoculation. There was some evidence that phage may activate a sublethal dose of the streptococcus in mice.

Bacteriophage injected intravenously into rabbits simultaneously with a dose of streptococcus which would kill the majority, but not all of the control rabbits, failed to influence appreciably the mortality rate. There was some evidence, however, that the course of the disease was unusually violent in the phage-treated rabbits which succumbed to the infection. The same results were obtained when bacteriophage was injected into rabbits three days before the infecting dose of streptococcus.

Bacteriophage injected intravenously into a rabbit could be demonstrated in the blood until the second day, but it had disappeared

from the blood on the third day. It could then be demonstrated in the spleen, but not in the liver.

In test-tube experiments bacteriophagy is completely inhibited by blood, pus, ascitic fluid, bile, and saliva. It is partially inhibited by urine.

The fluid portion of blood and of pus contains the active inhibitory constituent, the washed whole cells being almost or quite inert under the conditions of these experiments.

In addition to the definite inactivation of phage by undiluted or slightly diluted body fluids, there is an irregular inhibition in higher dilutions, caused by unknown factors.

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COURT DECISION RELATING TO PUBLIC HEALTH

State water commission act held unconstitutional.—(West Virginia Supreme Court of Appeals; Danielley et al. *v.* City of Princeton, 167 S.E. 620; decided Jan. 24, 1933.) Under the law relating to the State water commission, the city of Princeton was directed by the said commission to cease depositing sewage in a certain creek or to install either of certain systems which would reduce or eliminate the sewage pollution found to exist. The law provided that the circuit court should review any order of the commission, that such court could hear and consider any pertinent evidence offered, etc., and that it should determine all questions arising on the law and evidence and render such judgment or make such order upon the whole matter as law and equity required. On certification to the supreme court of appeals, that court held the statute to be unconstitutional because it committed executive powers to the judiciary. In the course of its opinion the appellate court, in part, said:

A hearing before the commission involves the determination (1) of whether the act complained of is a statutory pollution, and, if so, (2) of the proper sewage treatment or system of filtration to reduce the pollution. The first determination is quasi-judicial; the second is executive or administrative. An order of the commission properly determining these questions is an order on the whole matter. Upon appeal from the commission, the circuit court, in order to pass upon the whole matter, would have to review the identical questions primarily determined by the commission. A review of the system (for the regulation of the pollution) adopted by the commission and the approval of that or some other system by the court would require the court itself to exercise discretion; i.e., executive power. Whether the proceeding before the court be regarded as certiorari or appeal, the court cannot substitute its discretion for that of the commission lawfully exercised. [Cases cited.] The legislative, executive, and judicial powers under the Constitution (art. 5) are each, in its own sphere of duty, independent of and exclusive of the other; so that, whenever a subject is committed to the discretion of the legislative or executive department, the lawful exercise of that discretion cannot be controlled by the judiciary. * * *

DEATHS DURING WEEK ENDED APRIL 1, 1933

[From the Weekly Health Index issued by the Bureau of the Census, Department of Commerce]

	Week ended Apr. 1, 1933	Corresponding week, 1932
Data from 85 large cities of the United States:		
Total deaths	8,099	9,459
Deaths per 1,000 population, annual basis	11.3	13.5
Deaths under 1 year of age	595	685
Deaths under 1 year of age per 1,000 estimated live births [1]	52	58
Deaths per 1,000 population, annual basis, first 13 weeks of year	12.3	12.7
Data from industrial insurance companies:		
Policies in force	68,635,399	73,717,468
Number of death claims	14,432	18,540
Death claims per 1,000 policies in force, annual rate	11.0	13.1
Death claims per 1,000 policies, first 13 weeks of year, annual rate	11.2	10.4

[1] 1933, 81 cities; 1932, 80 cities

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended April 8, 1933, and April 9, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended April 8, 1933, and April 9, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Apr. 8, 1933	Week ended Apr. 9, 1932	Week ended Apr. 8, 1933	Week ended Apr. 9, 1932	Week ended Apr. 8, 1933	Week ended Apr. 9, 1932	Week ended Apr. 8, 1933	Week ended Apr. 9, 1932
New England States:								
Maine		1	[1] 96	7	4	246	0	0
New Hampshire			1		5	13	0	0
Vermont	2	3			17	73	0	0
Massachusetts	7	30	1	12	472	661	2	5
Rhode Island	4	5				133	0	1
Connecticut	4	6	19	19	275	112	0	2
Middle Atlantic States.								
New York	94	111	[2] 23	[2] 60	3,977	2,484	6	7
New Jersey	17	29	30	67	2,036	573	2	0
Pennsylvania	90	90			1,747	1,947	7	5
East North Central States:								
Ohio	29	35	16	71	865	820	1	1
Indiana	16	36	30	138	119	83	3	0
Illinois	22	104	43	85	481	649	29	0
Michigan	17	14	17	28	1,173	1,294	2	2
Wisconsin	3	3	38	330	466	1,007	1	1
West North Central States:								
Minnesota	6	12		5	1,297	61	0	0
Iowa	10	3			4	3	4	2
Missouri	21	15	9	31	259	60	3	1
North Dakota	2				84	52	0	0
South Dakota	2			2	12	14	1	0
Nebraska	9	2	35		27	1	0	0
Kansas	7	10	6	12	349	270	4	2
South Atlantic States:								
Delaware	3		1	7	4	2	0	0
Maryland [3]	9	10	18	303	28	46	1	3
District of Columbia	4	7		3	6	9	0	2
Virginia	12				274		3	4
West Virginia	20	16	14	367	291	419	0	5
North Carolina	24	22	22	168	636	428	1	1
South Carolina	8	6	352	2,262	229	118	0	0
Georgia [4]	10	15	102	209	84	33	1	1
Florida	10	6	1	5	58	6	0	2
East South Central States:								
Kentucky	10	12	35	469	58	58	2	0
Tennessee	13	8	66	730	35	209	2	3
Alabama [4]	11	18	43	294	51	10	0	1
Mississippi	11	6					0	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended April 8, 1933, and April 9, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Apr. 8, 1933	Week ended Apr. 9, 1932	Week ended Apr. 8, 1933	Week ended Apr. 9, 1932	Week ended Apr. 8, 1933	Week ended Apr. 9, 1932	Week ended Apr. 8, 1933	Week ended Apr. 9, 1932
West South Central States:								
Arkansas	8	3	12	198	464	--------	0	0
Louisiana	10	28	15	37	29	27	0	1
Oklahoma [5]	1	9	71	231	89	20	10	3
Texas [4]	67	39	186	625	1,139	57	3	0
Mountain States:								
Montana	1	5	23	13	44	138	0	0
Idaho	1	1	--------	3	36	--------	0	0
Wyoming [6]	--------	--------		--------	6	4	0	0
Colorado	3	4	29	--------	4	139	1	0
New Mexico	4	10	1	1	8	50	0	0
Arizona	--------	1	1	9	32	2	1	0
Utah [3]	1	2	2	--------	12	2	1	0
Pacific States								
Washington	10	1	1	--------	45	513	0	0
Oregon	1	4	29	65	47	332	0	0
California	45	62	47	62	1,219	534	4	5
Total	659	804	1,435	7,000	18,600	13,721	95	69

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Apr. 8, 1933	Week ended Apr. 9, 1932	Week ended Apr. 8, 1933	Week ended Apr. 9, 1932	Week ended Apr. 8, 1933	Week ended Apr. 9, 1932	Week ended Apr. 8, 1933	Week ended Apr. 9, 1932
New England States:								
Maine	0	0	23	21	0	0	1	0
New Hampshire	0	0	35	32	0	0	0	0
Vermont	0	0	12	7	1	3	0	0
Massachusetts	0	0	450	500	0	0	2	1
Rhode Island	0	0	27	71	0	0	0	0
Connecticut	0	1	167	85	0	0	0	1
Middle Atlantic States:								
New York	0	1	1,116	1,442	0	0	6	6
New Jersey	0	1	380	282	0	0	3	2
Pennsylvania	1	3	990	578	0	0	7	7
East North Central States:								
Ohio	1	1	764	351	33	45	6	5
Indiana	0	1	190	178	4	12	1	0
Illinois	0	1	507	439	5	10	8	5
Michigan	3	1	665	436	2	13	2	11
Wisconsin	0	1	160	103	1	3	10	1
West North Central States:								
Minnesota	0	0	101	124	1	1	0	0
Iowa	0	0	55	36	26	27	0	3
Missouri	0	0	108	62	14	18	1	1
North Dakota	0	0	9	26	1	3	0	0
South Dakota	0	1	18	4	2	2	5	0
Nebraska	0	0	33	31	2	11	5	0
Kansas	0	0	67	70	1	6	1	0
South Atlantic States:								
Delaware	0	1	17	11	0	0	0	0
Maryland [3]	0	0	120	155	0	0	3	6
District of Columbia	0	1	12	23	0	0	0	0
Virginia	0	--------	61	--------	1	--------	7	--------
West Virginia	0	1	25	26	0	3	4	1
North Carolina	0	0	53	44	0	1	0	6
South Carolina	0	0	10	9	2	0	7	7
Georgia [4]	0	0	6	7	1	0	4	11
Florida	1	0	3	6	0	0	2	15
East South Central States:								
Kentucky	0	1	64	63	0	9	10	8
Tennessee	0	1	25	32	2	14	4	7
Alabama [4]	0	0	5	14	2	11	2	6
Mississippi	0	0	16	13	0	23	8	2

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended April 8, 1933, and April 9, 1932—Continued

State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Apr. 8, 1933	Week ended Apr. 9, 1932	Week ended Apr. 8, 1933	Week ended Apr. 9, 1932	Week ended Apr. 8, 1933	Week ended Apr. 9, 1932	Week ended Apr. 8, 1933	Week ended Apr. 9, 1932
West South Central States:								
Arkansas	0	0	3	5	53	6	0	2
Louisiana	0	0	10	15	0	6	23	16
Oklahoma [5]	0	0	13	33	5	11	0	1
Texas [4]	0	0	73	62	33	113	11	3
Mountain States:								
Montana	0	0	18	10	2	0	0	1
Idaho	0	3	2	3	8	0	0	0
Wyoming [6]	0	0	11	6	0	0	2	2
Colorado	0	0	31	30	10	3	1	1
New Mexico	0	0	12	18	2	0	2	4
Arizona	0	0	10	11	0	0	0	1
Utah [3]	0	0	9	8	0	0	0	0
Pacific States:								
Washington	0	0	62	38	9	29	1	1
Oregon	0	0	16	10	4	8	3	3
California	3	0	161	161	43	7	7	10
Total	9	20	6,725	5,701	270	398	154	157

[1] Includes delayed reports.
[2] New York City only.
[3] Week ended Friday.
[4] Typhus fever, week ended April 8, 1933, 9 cases: 3 cases in Georgia, 3 cases in Alabama, and 3 cases in Texas.
[5] Figures for 1933 are exclusive of Oklahoma City and Tulsa.
[6] Rocky Mountain Spotted fever, week ended April 8, 1933, 2 cases in Wyoming.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
February 1933										
Mississippi	4	28	5,989	950	1,536	238	0	40	7	17
Nevada		1	53		3		0	16	1	0
March 1933										
Alabama	4	55	502	16	114	16	1	55	17	10
Connecticut	5	21	72		1,044		0	631	5	2
Indiana	24	122	334		389		1	605	9	7
Iowa	10	41	1		42		1	186	174	1
Massachusetts	2	90	34	1	1,547		1	1,913	0	9
Missouri	31	128	70		1,063		1	416	36	10
Nebraska	2	50	27		95		0	178	5	0
Pennsylvania	37	314			6,319		3	4,892	0	33
Tennessee	16	36	383	76	205	9	2	191	5	25
Vermont		3			154			88	1	1

February, 1933

	Cases
Mississippi:	
Chicken pox	425
Dengue	3
Dysentery (amebic)	34
Hookworm disease	268
Mumps	274
Ophthalmia neonatorum	3
Puerperal septicemia	19
Rabies in animals	3
Trachoma	2
Tularaemia	1
Whooping cough	757
Nevada:	
Chicken pox	15

March, 1933

	Cases
Actinomycosis:	
Massachusetts	2
Pennsylvania	1
Anthrax:	
Massachusetts	2
Pennsylvania	1
Chicken pox:	
Alabama	80
Connecticut	591
Indiana	673
Iowa	204
Massachusetts	1,505
Missouri	264
Nebraska	313
Pennsylvania	5,250
Tennessee	394
Vermont	112
Conjunctivitis, infectious:	
Connecticut	1
Dysentery:	
Massachusetts	1
Missouri	2
Pennsylvania	1
Tennessee	2
German measles:	
Connecticut	24
German measles—Contd.	
Iowa	5
Massachusetts	46
Pennsylvania	99
Tennessee	150
Impetigo contagiosa:	
Tennessee	6
Lead poisoning:	
Massachusetts	3
Lethargic encephalitis:	
Alabama	9
Nebraska	1
Pennsylvania	6
Tennessee	1
Mumps:	
Alabama	165
Connecticut	448
Indiana	266
Iowa	292
Massachusetts	1,098
Missouri	288
Nebraska	242
Pennsylvania	2,579
Tennessee	172
Vermont	237
Ophthalmia neonatorum:	
Indiana	1
Iowa	2
Massachusetts	103
Pennsylvania	19
Tennessee	1
Paratyphoid fever:	
Massachusetts	1
Tennessee	1
Puerperal septicemia:	
Pennsylvania	11
Tennessee	2
Rabies in animals:	
Connecticut	7
Missouri	24
Tennessee	56
Scabies:	
Tennessee	24
Septic sore throat:	
Connecticut	14
Massachusetts	28
Septic sore throat—Contd.	
Missouri	7
Nebraska	6
Tennessee	41
Tetanus:	
Alabama	1
Pennsylvania	2
Trachoma:	
Connecticut	1
Indiana	1
Massachusetts	2
Missouri	111
Tennessee	15
Trichinosis:	
Connecticut	10
Massachusetts	1
Pennsylvania	3
Tularaemia:	
Missouri	3
Tennessee	7
Typhus fever:	
Alabama	15
Tennessee	25
Undulant fever:	
Connecticut	4
Iowa	8
Missouri	20
Pennsylvania	1
Tennessee	1
Vermont	4
Vincent's angina:	
Indiana	4
Tennessee	18
Whooping cough:	
Alabama	140
Connecticut	467
Indiana	135
Iowa	65
Massachusetts	1,138
Missouri	48
Nebraska	49
Pennsylvania	1,139
Tennessee	129
Vermont	62

WEEKLY REPORTS FROM CITIES

City reports for week ended April 1, 1933

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	0	------	0	0	3	3	0	0	0	12	25
New Hampshire:											
Concord	0	------	0	0	0	1	0	0	0	0	10
Manchester	0	------	0	0	0	4	0	0	0	0	10
Nashua	0	------	0	0	0	0	0	0	0	0	------
Vermont:											
Barre	0	------	0	1	0	0	0	0	0	17	1
Burlington	0	------	0	0	0	3	0	0	0	0	18
Massachusetts:											
Boston	2	3	1	96	12	85	0	6	0	78	223
Fall River	1	1	1	0	2	14	0	2	0	4	30
Springfield	0	------	0	1	0	8	0	5	1	14	47
Worcester	2	------	1	7	3	25	0	6	0	12	41
Rhode Island:											
Pawtucket	------	------	------	------	------	------	------	------	------	------	------
Providence	1	------	0	0	5	15	0	1	0	25	68
Connecticut:											
Bridgeport	0	------	1	25	4	16	0	1	1	0	42
Hartford	0	1	0	16	6	25	0	1	0	5	27
New Haven	0	------	0	2	4	11	0	1	0	8	41
New York:											
Buffalo	9	------	0	46	19	70	0	7	0	36	131
New York	43	37	10	2,703	148	305	0	97	1	145	1,504
Rochester	1	------	1	3	2	35	0	2	0	11	81
Syracuse	0	------	1	1	4	32	0	0	1	13	56

City reports for week ended April 1, 1933—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
New Jersey:											
Camden	1	2	2	3	1	12	1	0	0	0	28
Newark	6	5	0	609	9	37	0	2	0	31	85
Trenton	2		0	47	8	21	0	3	1	4	40
Pennsylvania:											
Philadelphia	3	9	3	141	35	149	0	25	1	9	482
Pittsburgh	4	3	2	5	10	56	0	11	1	19	142
Reading	0		0	63	2	16	0	0	0	3	17
Scranton	0			1		38	0		0	0	
Ohio:											
Cincinnati	3	2	1	8	8	32	0	9	0	2	130
Cleveland	6	79	0	4	12	305	0	9	0	37	190
Columbus	4	1	1	44	6	12	0	4		0	67
Toledo	1		0	352	2	142	0	2		10	61
Indiana:											
Fort Wayne	4		0	0	4	7	0	2		0	32
Indianapolis											
South Bend	0		0	4	2	10	0	1	0	4	25
Terre Haute	0		1	0	3	9	0	1	1	1	21
Illinois:											
Chicago	13	2	0	480	50	358	0	42	1	22	644
Springfield	0		0	2	5	1	0	0	1	0	27
Michigan:											
Detroit	7	10	3	696	9	208	0	27	2	167	285
Flint	0	5	0	306	5	8	0	1	0	3	23
Grand Rapids	0		0	5	2	5	0	1	0	22	37
Wisconsin:											
Kenosha	0		0	0	0	4	1	0	0	6	4
Madison	0			165		3	0		0	3	
Milwaukee	1		0	3	3	24	0	1	0	42	90
Racine	0		0	1	0	3	0	0	0	10	16
Superior	0		0	0	0	0	0	0	0	10	5
Minnesota:											
Duluth	0		0	1	2	0	0	2	0	62	19
Minneapolis	4		2	317	8	51	0	2	0	30	92
St. Paul	0		0	678	2	12	0	3	0	70	49
Iowa:											
Des Moines	0			0		4	0		0	0	24
Sioux City											
Waterloo	0			0		0	1		0	0	
Missouri:											
Kansas City	2		1	132	11	21	0	3	0	2	106
St. Joseph	0		0	41	8	1	0	0	0	1	33
St. Louis	16	2	2	22	7	15	0	14	1	3	210
North Dakota:											
Fargo	0		0	0	1	0	0	0	0	0	8
Grand Forks	0		0	0	0	8	0	0	0	0	
Nebraska:											
Omaha	5		0	15	5	5	0	1	0	2	52
Kansas:											
Topeka	0		0	117	3	1	0	0	0	0	13
Wichita	0		1	0	2	0	0	3	0	8	27
Delaware:											
Wilmington	1		0	12	8	4	0	2	0	0	38
Maryland:											
Baltimore	4		0	1	28	78	0	14	0	15	206
Cumberland	0		0	0	1	2	0	0	0	0	9
Frederick	0		0	0	1	0	0	0	0	0	4
District of Col.:											
Washington	3	2	2	4	9	17	0	13	0	2	153
Virginia:											
Lynchburg	2		0	0	0	0	0	0	0	2	12
Norfolk	0		0	2	4	4	0	2	0	1	32
Richmond	0		0	6	2	9	0	1	0	0	45
Roanoke	0		0	107	0	2	0	0	0	0	17
West Virginia:											
Charleston	0	2	1	2	1	1	0	1	0	0	27
Huntington	1			3		1	0		0	0	
Wheeling	0		0	8	2	0	0	0	0	3	11
North Carolina:											
Raleigh	0		0	0	0	0	0	0	0	1	11
Wilmington	0		0	178	1	0	0	0	0	0	10
Winston-Salem	2	1	0	8	1	5	0	5	1	4	21
South Carolina:											
Charleston	0	22	0	0	0	0	0	2	0	1	24
Columbia											
Greenville	0		0	27	1	0	0	0	0	0	5

City reports for week ended April 1, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Georgia:											
Atlanta	1	22	3	14	8	4	0	8	1	18	85
Brunswick	0	-------	0	1	1	0	0	0	0	0	5
Savannah	0	38	0	0	1	1	0	2	0	0	21
Florida:											
Miami	3	4	1	1	0	0	0	2	2	37	24
Tampa	1	1	1	0	3	0	0	0	2	3	28
Kentucky:											
Ashland	1	-------	0	36	0	0	0	0	0	1	0
Lexington	0	3	0	5	2	1	0	2	0	1	13
Tennessee:											
Memphis	2	-------	2	16	6	4	0	7	1	4	73
Nashville	1	-------	0	0	2	1	0	5	0	0	58
Alabama:											
Birmingham	1	4	7	3	3	10	0	3	0	1	58
Mobile	0	-------	1	4	1	1	0	1	0	0	23
Montgomery	0	-------	-------	1	-------	0	0	-------	0	0	-------
Arkansas:											
Fort Smith	0	-------	-------	3	-------	0	0	-------	0	2	-------
Little Rock	1	-------	0	14	1	1	1	0	0	0	1
Louisiana:											
New Orleans	5	10	8	9	12	9	1	10	2	7	139
Shreveport	0	-------	0	0	8	1	0	2	0	0	43
Oklahoma:											
Oklahoma City	1	20	0	6	5	2	1	0	0	0	42
Tulsa	0	-------	-------	44	-------	2	9	-------	0	3	-------
Texas:											
Dallas	13	1	1	-------	4	0	0	2	1	3	53
Fort Worth	1	-------	0	89	5	1	0	0	0	0	29
Galveston	1	-------	0	1	1	2	0	1	1	0	14
Houston	8	-------	0	24	10	2	0	4	0	0	63
San Antonio	1	-------	5	20	7	1	0	5	0	0	54
Montana:											
Billings	0	-------	0	0	0	0	0	0	0	0	7
Great Falls	0	-------	0	1	0	0	0	0	0	3	8
Helena	0	-------	0	0	0	0	0	0	0	0	1
Missoula	0	-------	0	0	0	2	0	0	0	0	3
Idaho:											
Boise	0	-------	0	16	0	0	2	0	0	0	6
Colorado:											
Denver	2	29	1	2	12	13	0	5	0	2	101
Pueblo	1	-------	0	0	0	3	0	0	0	5	4
New Mexico:											
Albuquerque	0	-------	0	8	0	1	0	7	0	0	10
Arizona:											
Phoenix	0	-------	0	-------	1	2	0	2	0	0	-------
Utah:											
Salt Lake City	0	-------	0	0	2	5	0	0	0	16	31
Nevada:											
Reno	0	-------	0	0	0	1	0	0	0	0	5
Washington:											
Seattle	0	-------	-------	7	-------	9	1	-------	0	9	-------
Spokane	0	-------	-------	0	-------	1	0	-------	0	0	-------
Tacoma	1	-------	0	0	3	1	1	1	0	0	23
Oregon:											
Portland	0	-------	1	5	3	10	2	4	0	2	77
Salem	0	-------	0	22	0	0	0	0	0	0	-------
California:											
Los Angeles	16	12	1	521	13	42	40	23	0	57	303
Sacramento	0	1	0	0	4	0	0	7	0	62	31
San Francisco	1	8	0	4	9	19	0	6	0	66	157

City reports for week ended April 1, 1933—Continued

State and city	Meningococcus meningitis		Polio-myelitis cases
	Cases	Deaths	
Massachusetts:			
Springfield	0	1	0
New York:			
New York	1	0	0
Pennsylvania:			
Philadelphia	1	0	0
Pittsburgh	2	2	0
Ohio:			
Toledo	1	1	0
Indiana:			
Fort Wayne	2	0	0
Illinois:			
Chicago	15	2	0
Michigan:			
Detroit	0	0	1
Missouri:			
Kansas City	0	1	0
Nebraska:			
Omaha	1	1	0
Georgia:			
Atlanta	2	1	0
Tennessee:			
Memphis	1	0	0
Louisiana:			
New Orleans	1	0	0
Texas:			
Fort Worth	1	0	0
Houston	0	1	0
Utah:			
Salt Lake City	1	1	0
Washington:			
Seattle	1	0	0
Spokane	0	0	1

Lethargic encephalitis.—Cases: New York, 2; Pittsburgh, 1; Chicago, 2; Fargo, 1; Baltimore, 1.
Pellagra.—Cases: Charleston, S.C., 3; Savannah, 1; Birmingham 1; Dallas, 2.
Typhus fever.—Cases: Savannah, 1.

FOREIGN AND INSULAR

BRITISH HONDURAS

Vital statistics—1931.—The following table shows birth and death rates in British Honduras during the year 1931:

Birth rate per 1,000 population	36.78
Death rate per 1,000 population	[1] 36.72
Infant mortality rate per 100 births	[1] 15.17
Population (estimated)	52,139

CANADA

Provinces—Communicable diseases—Two weeks ended March 25, 1933.—The Department of Pensions and National Health of Canada reports cases of certain communicable diseases for the two weeks ended March 25, 1933, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis	1	1		1	1	1	1			6
Chicken pox		6	1	243	611	45	30	15	144	1,095
Diphtheria		1	2	43	17	14	4			81
Erysipelas				21	1	6		1	1	30
Influenza		20		6	18	9	18		9	80
Measles	5	40	5	182	450	3		10	58	753
Mumps					425	77	33		44	579
Paratyphoid fever					3					3
Pneumonia (all forms)		3			17		23		14	57
Poliomyelitis			1	1	1				1	4
Scarlet fever		13	43	122	141	57	37	12	14	439
Smallpox					2		10			12
Trachoma					1		1		4	6
Tuberculosis	2	5	5	153	104	23	6	11	64	378
Typhoid fever			4	25	11	3			2	45
Undulant fever					2					2
Whooping cough		2	1	234	253	76	12		46	624

[1] The death rate for 1931 was almost twice as high as for 1930, and the infant mortality rate was also much higher (9.22 for 1930), due to the deaths caused by the hurricane of Sept. 10, 1931.

ITALY

Milan—Deaths from certain diseases—Years 1900, 1926, 1931, and 1932.—The following table shows the death rates per 10,000 population in the city of Milan, Italy, from certain causes during the years 1900, 1926, 1931, and 1932:

Cause of death	Death rate per 10,000 population			
	1900	1926	1931	1932
Apoplexy	13.50	7.43	9.54	10.78
Arteriosclerosis	3.16	7.23	4.42	4.60
Bronchitis and pneumonia	44.74	22.09	22.60	21.60
Cancer	8.75	10.18	10.64	10.88
Enteritis	15.41	8.29	4.52	4.05
Heart diseases	13.92	13.12	12.85	14.83
Influenza	3.97	2.46	2.02	1.37
Old age	9.95	4.83	3.37	3.51
Typhoid fever	4.73	3.57	0.57	0.56
Other causes	106.87	55.40	47.17	47.52
Total	225.00	134.60	117.70	119.70

MEXICO

Tampico—Communicable diseases—March, 1933.—During the month of March, 1933, certain communicable diseases were reported in Tampico, Mexico, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	2	1	Paratyphoid fever	2	1
Enteritis (various)	42	47	Tuberculosis		42
Influenza	35		Typhoid fever	6	3
Leprosy	1		Whooping cough	7	
Malaria	221	4			

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

(NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for March 31, 1933, pp 334–315. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued April 28, 1933, and thereafter, at least for the time being, in the issue published on the last Friday of each month)

Cholera

Philippine Islands.—During the week ended April 8, 1933, no case of cholera was reported in the Philippine Islands.

Plague

Argentina.—During the month of March, 1933, 2 cases of plague, with 1 death, were reported at Rosario, Argentina, and 5 cases, with 2 deaths, in Cordoba Province.

On vessel.—The steamship *Kingsborough* was reported at an Argentina port during March, 1933, with a case of plague aboard.

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HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst. Surg Gen. R. C. WILLIAMS, *Chief of Division*

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They contain: (1) Current information of the prevalence and geographic distribution of preventable diseases in the United States in so far as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other communicable diseases throughout the world. (2) Articles relating to the cause, prevention, or control of disease. (3) Other pertinent information regarding sanitation and the conservation of public health.

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PUBLIC HEALTH REPORTS

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CHANGES IN THE TEETH OF WHITE RATS GIVEN WATER FROM A MOTTLED ENAMEL AREA COMPARED WITH THOSE PRODUCED BY WATER CONTAINING SODIUM FLUORIDE

By W. H. SEBRELL, *Passed Assistant Surgeon*, H. T. DEAN, *Dental Surgeon*, E. ELVOVE, *Senior Chemist*, and R. P. BREAUX, *Assistant Dental Surgeon*, *National Institute of Health, United States Public Health Service*

INTRODUCTION

The manifestations of fluorosis in the incisor teeth of white rats were first described in detail by McCollum, Simmonds, Becker, and Bunting (1), although Schulz and Lamb (2), in an earlier publication, had noted an unusual overgrowth of the upper incisors of rats fed fluorine in the form of sodium fluoride. Sollman, Schettler, and Wetzel (3) studied the effect of sodium fluoride on albino rats by feeding graduated doses of 0.0002, 0.002, 0.01, 0.02, 0.04, and 0.23 per cent of the ration. They report no effect on either growth or food consumption in the rats fed the three lowest amounts. They do, however, note a progressive impairment of growth and food consumption beginning with the 0.02 per cent dose. These workers make no comment on changes in the teeth. McCollum and his associates (1) included 0.05 per cent (500 p. p. m.) of sodium fluoride in an otherwise satisfactory stock diet. Eight of the ten animals of the first generation group were carried on the fluorine diet for over 200 days. These workers noted that the orange tint seen on the anterior surface of the incisors of normal rats was generally absent. The teeth grew abnormally, the superior incisors tending in nearly every case to curve backwards forming the arc of a circle and finally penetrating the roof of the mouth. This was presumably due to the fact that they were not worn down by attrition. McCollum and associates believe these changes to be due to alteration in structure and hardness. In 1927, Bergara (4) reported that white rats on 64 milligrams of sodium fluoride per kilogram of body weight incorporated into a diet of white bread and milk showed symmetrical coffee or chocolate colored bands on both the superior and inferior incisors after about four months' feeding. The bands are not unlike those described by Chaneles (5) and Pachaly (6). Tolle and Maynard (7), in 1929, reported that rats fed rock phosphate, treble superphosphate, and sodium fluoride showed the characteristic tooth changes described by McCollum.

The most complete report in the literature on the production of experimental fluorosis in white rats is probably that of Chaneles (5). This worker studied the effect of fluorine from several different angles. His experiments included feeding (*a*) fluorine as sodium fluoride, (*b*) sodium fluoride plus ultra-violet radiation, (*c*) sodium iodide, and (*d*) sodium fluoride and sodium iodide. The fluorine dosage was 50 milligrams of sodium fluoride per kilogram of body weight, and was incorporated into a diet of white bread and milk. The histopathology of the affected teeth is reported and illustrated in detail.

In an experiment conducted by McClure and Mitchell (8) groups of three paired white rats were fed approximately 0.02, 0.06, and 0.12 per cent of sodium fluoride in the ration, and groups of four paired white rats were fed approximately 0.06 and 0.12 per cent of calcium fluoride incorporated in the basal ration. They state that no visible effects were noted in the rats receiving the 0.02 per cent of sodium fluoride, although higher levels of fluorine, both in the form of sodium fluoride and calcium fluoride, brought about changes in the teeth similar to those reported by McCollum and his associates (1). They further note that the insoluble calcium fluoride was as effective as the soluble sodium fluoride in bringing about changes in tooth structure.

The probable relationship between mottled enamel and the fluoride content of the drinking water was shown by Churchill (9). The first workers to associate experimental fluorosis in the white rat with the dental dystrophy known as mottled enamel were Smith, Lantz, and Smith (10). They report feeding rats St. David (an endemic mottled enamel area in Arizona) drinking water which had been concentrated by evaporation to one-tenth of the original volume. Seven samples of St. David water were analyzed for fluorine content and amounts varying from 3.8 to 7.1 parts per million were found. The amount of fluoride in the particular St. David water used was not stated. In another experiment they report incorporating St. David water residue directly into the ration fed the experimental animal. The amount so incorporated is not stated. At the end of a month the enamel of the teeth became dull, chalky white, and pitted. These same workers fed white rats sodium fluoride in graduated doses of 0.025, 0.05, and 0.1 per cent of the ration and observed tooth changes similar to those reported by McCollum (1). They conclude that the tooth changes produced by feeding the St. David water concentrate and the residue from the St. David water are identical with the changes produced in the teeth by the inclusion of sodium fluoride in the ration.

Velu fed white rats calcium fluoride (11) and rock phosphate (12) containing about 3 to 4 per cent of fluorine and reported the characteristic changes in the teeth described by previous workers. He (13) also reported that a similar condition was produced by feeding

groups of white rats water associated with Moroccan and Algerian rock phosphate.

Smyth and Smyth (14) report tooth changes similar to those described by McCollum and his associates (1) in white rats fed fluorine in the form of cryolite (Na_3AlF_6) and barium fluosilicate ($BaSiF_6$). The fluorine compound was mixed with the basic diet. Bethke, Kick, Hill, and Chase (15) state that fluorine added to the diet of rats results in a hypoplasia of the enamel and dentine and that the severity of the hypoplasia is proportional to the amount of fluorine ingested and the form in which it is added to the diet. In their experiments they utilized four different forms of fluorine compounds in dosages of equivalent fluorine content and found that calcium fluoride produced the least and sodium fluoride the greatest deleterious effect on the teeth. Rock phosphate and phosphatic limestone both produced an effect intermediate between that of calcium fluoride and sodium fluoride.

EXPERIMENTAL

The purpose of this experiment was to compare the changes in the teeth of white rats receiving small quantities of sodium fluoride in the drinking water with those produced by water from an endemic mottled enamel area. Conway, Horry County, S. C., is an endemic mottled enamel area of particular interest to us since a survey by Dean (16) has shown a high incidence of mottled enamel among the children using the municipal water supply during the period of calcification of their permanent teeth.

Water from the municipal water supply was shipped in 5-gallon Pyrex glass bottles to this laboratory for the experiment. A sample of this water was analyzed [1] by the methods given in the Standard Methods of Water Analysis of the American Public Health Association. The fluoride was estimated by the ferric chloride method, using a procedure similar to that used by Churchill (9). Controls were carried out with synthetic waters, which were prepared on the basis of the chemical analysis, but omitting the fluoride or adding known quantities of it. The results obtained are given in Table 1.

TABLE 1.—*Analysis of municipal water of Conway, S. C.*

	Parts per million
Residue on evaporation (180° C.)	640. 0
Loss on ignition	17. 5
Fixed residue	622. 5
Silica (SiO_2)	19. 0
Iron (Fe)	. 04
Calcium (Ca)	1. 9
Magnesium (Mg)	. 9
Sodium (Na)	250. 3

[1] Assistant Chemist C. G. Remsburg assisted in this work.

	Parts per million
Potassium (K)	5. 1
Carbonate (CO_3)	20. 4
Bicarbonate (HCO_3)	528. 9
Sulphate (SO_4)	5. 6
Nitrate (NO_3)	. 4
Chloride (Cl)	48. 5
Fluoride (F)	6. 0

Since the etiological factor in the production of mottled enamel is apparently associated with the water supply it was decided in this experiment to incorporate the fluoride into the drinking water. The experimental animals were divided into five groups of six rats each. All received the same diet, the composition of which is given in Table 2. It is to be noted that the salt mixture used in this diet adds about 10 parts per million of fluorine to the diet.

TABLE 2.—*Composition of diet*

	Per cent
Casein, leached	20
Salt mixture [2]	4
Brewer's yeast	5
Cottonseed oil	3
Cod-liver oil	2
Cornstarch	66

The rats were kept in individual metal cages having screen bottoms of ¾-inch wire mesh. The diet was weighed and served in glass cups. About every three days the residue was weighed and the cups refilled. The drinking water was supplied in rubber-stoppered glass bottles attached to the outside of the cages, the rats having access to the water by means of glass tubes. An attempt was made to check the amount of water consumed by measuring the residue, but no accurate estimate could be made because of the inability to measure the quantity of water wasted, which in some instances represented a considerable amount.

The rats were examined carefully three times a week, and weighed once a week. The pellets of feces were counted and the consistency was noted three times a week. No evidence of diarrhea was seen in any of the experimental animals.

Group I (lot 1131) was given distilled drinking water. These animals grew normally and presented no evidence of disease. The teeth showed the orange color of normal rats. (Fig. 1.) The rate of growth is shown in Chart 1.

Group II (lot 1130) was given Conway, S. C., water which had been concentrated to one-tenth of its volume by evaporating at about 85°–90° C. These animals grew normally and the only gross pathological changes noted were in the teeth. Within 10 days from the

[2] Prepared according to Osborne and Mendel. J. Biol. Chem., vol. 37, p. 572 (1919).

beginning of the experiment the normal orange color had disappeared from the labial surfaces of the lower incisors, which appeared whitish except for an opaque orange spot at the tip of each tooth. Within the next week the lower incisors became a translucent white throughout their length. Within 52 days small brown spots appeared on the

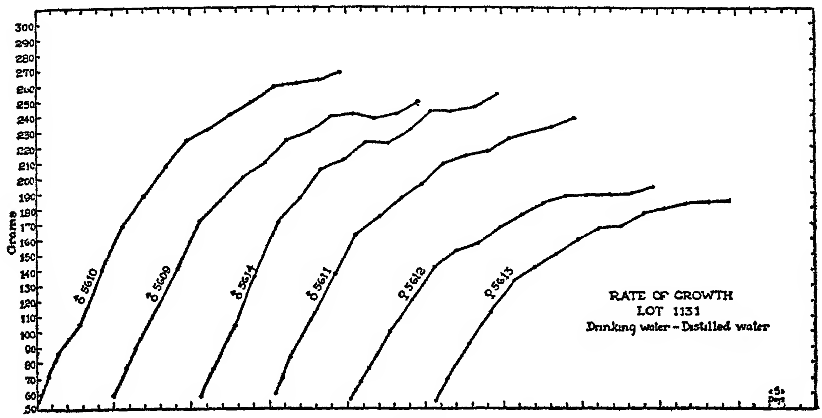

CHART 1

labial surfaces of the lower incisors. (Fig. 2.) Within 80 days these brown spots had covered the entire length of the lower incisors and assumed the appearance of closely spaced, narrow, brown, transverse striations. The rate of growth is shown in Chart 2.

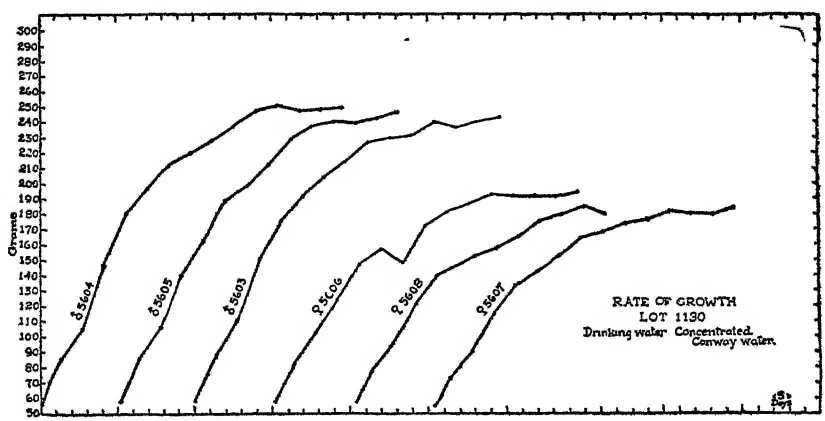

CHART 2

Group III (lot 1129) was given a synthetic drinking water comparable quantitatively to the concentrated Conway water and containing all of the ions shown by the Conway water analysis to be present in amounts greater than one-half of one part per million, with the exception of fluorine. This lot was carried in order to determine whether this mixture of mineral salts without fluorine would cause

any recognizable tooth changes. These animals grew normally and presented no evidence of disease. The teeth showed the orange color of normal rats. (Fig. 3.) The rate of growth is shown in Chart 3.

Group IV (lot 1132) was given a synthetic drinking water containing 150 parts per million of sodium fluoride in distilled water. These animals grew normally and the only gross pathological changes noted were in the teeth. The rate of growth is shown in Chart 4. The teeth showed changes similar to those appearing in the teeth of the rats on

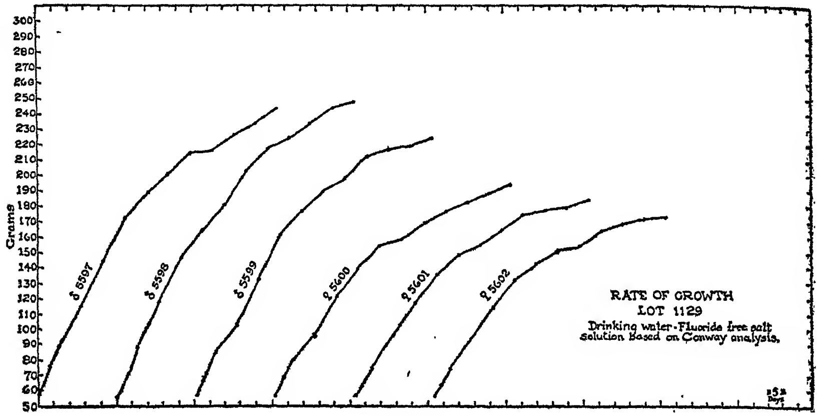

CHART 3

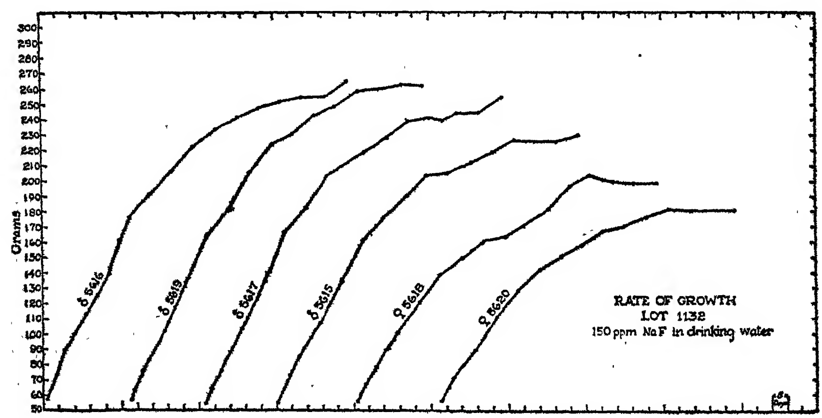

CHART 4

Conway water. Within 10 days from the beginning of the experiment the normal orange color had disappeared from the labial surfaces of the lower incisors, which appeared whitish except for an opaque orange spot at the tip of each tooth. Within the next week the lower incisors became a translucent white throughout their length. Within 52 days from the beginning of the experiment, small brown spots appeared on the labial surfaces of the lower incisors. These spots increased in size and number until they were scattered over the entire

FIGURE 1.—Teeth of rat receiving distilled drinking water, showing appearance of incisors of normal rat. The apparent white spots are due to high lights

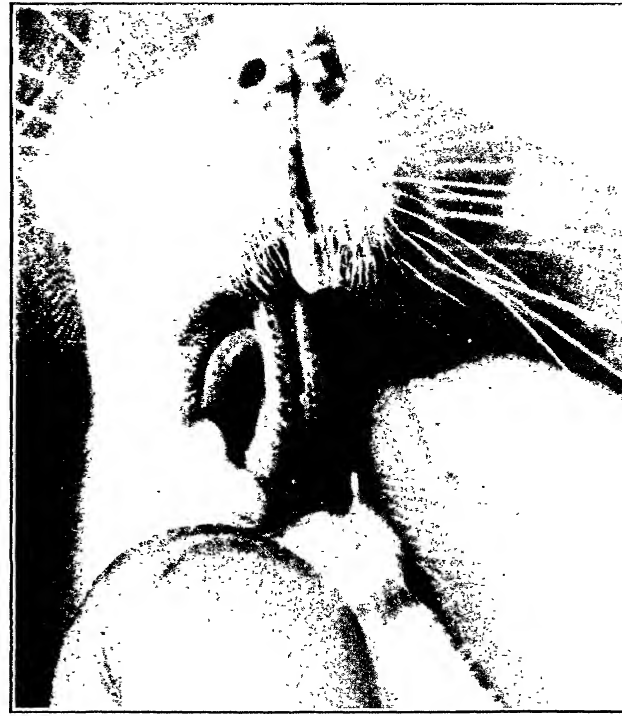

FIGURE 2.—Teeth of rat receiving concentrated Conway water, showing loss of normal color and appearance of brown spots on incisors

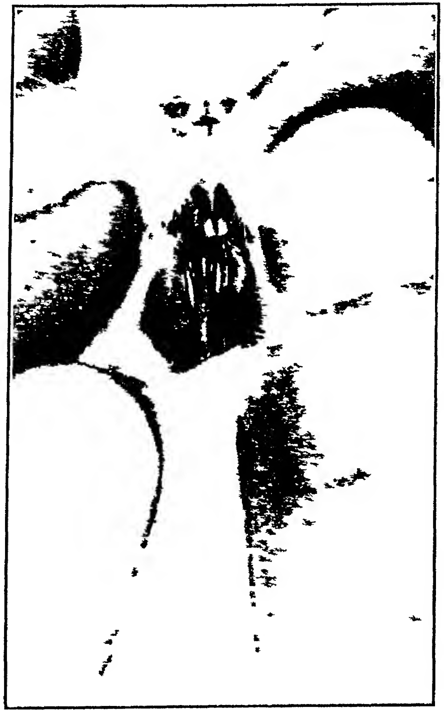

FIGURE 3. Teeth of rat on synthetic drinking water comparable to concentrated Conway water with fluorine omitted. Teeth apparently normal. White spots due to lighting

FIGURE 4. Teeth of rat on drinking water containing 150 p.p.m. NaF showing loss of normal color and appearance of brown spots on incisors

FIGURE 5. Teeth of rat on drinking water containing 500 p.p.m. NaF showing loss of normal color, lower incisors broken off at gingival margin, overgrowth and backward curvature of upper incisors

labial surfaces (Fig. 4.) They appeared to differ from the lesions noted in the teeth of the rats on the Conway water only in their more irregular distribution.

Group V (lot 1128) was given distilled water containing 500 parts per million of sodium fluoride. The animals on this water gained weight for the first three days and then lost weight during the next week, followed by a rapid and continuous gain in weight, with the exception of one rat which died in 11 days from the beginning of the experiment. The remaining animals showed no gross pathological changes except in the teeth. The rate of growth is shown in Chart 5. Within 10 days the lower incisors had lost their normal orange color and were blanched except for an opaque orange spot at the incisal tip.

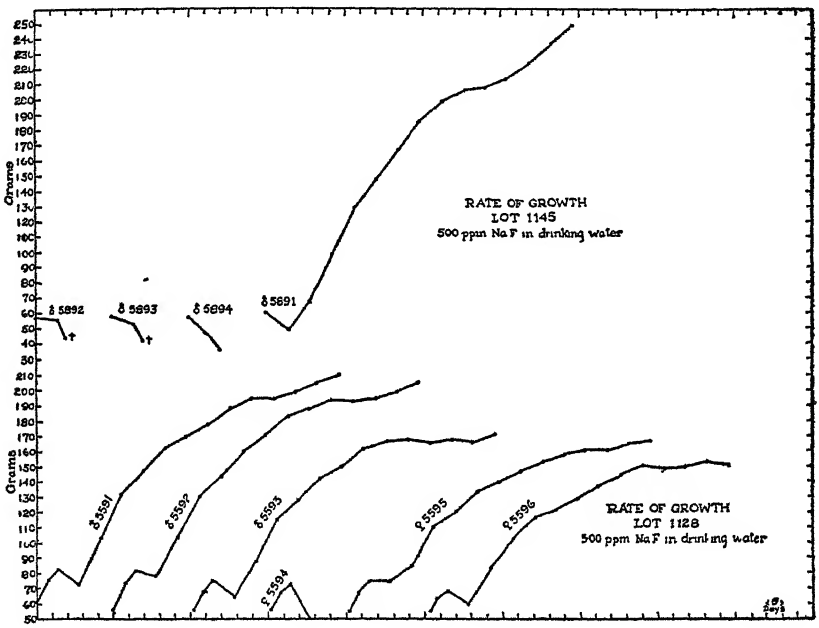

CHART 5

The teeth then gradually became chalky white and brittle. By the end of 52 days the teeth of some of the rats had broken off at the gingival margin or at the tips so that the opposing teeth, apparently because of lack of wear, became abnormally long. The upper incisors then tended to form the arc of a circle and penetrate the palate. (Fig. 5.)

An attempt was made to repeat the latter part of the experiment (i. e., with 500 p. p. m. of NaF) using a total of 20 rats. Sixteen rats died within 11 days. The four that survived the acute toxic effects of the fluorine grew well but showed the same chalky white, brittle teeth that were seen in the first group on this water. The rate of growth of one lot (lot 1145) is shown in Chart 5.

SUMMARY

A drinking water from an endemic mottled enamel area (Conway, S. C.) concentrated to one-tenth of its volume produced whitish incisors in white rats followed by the appearance of brown striations.

A synthetic drinking water comparable to the concentrated Conway water, and containing all of the ions found in the Conway water in amounts greater than one-half of one part per million excepting fluorine, did not cause any noticeable abnormality in the teeth of white rats.

A synthetic drinking water containing 150 parts per million of sodium fluoride caused a loss of the normal orange color of the incisors of white rats followed by the appearance of irregular brown spots similar to the changes produced by the Conway water.

A synthetic drinking water containing 500 parts per million of sodium fluoride was exceedingly toxic to young white rats and produced chalky white, brittle teeth in those surviving the acute toxic effect.

ACKNOWLEDGMENTS

We are greatly indebted to the Hon. L. D. Magrath, mayor of Conway, S. C., Dr. R. W. Ball, director of the Horry County Health Department, and Dr. Carl L. Busbee, president of the Pee Dee Dental Association, for their cooperation and assistance in supplying the Conway water used in this experiment.

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OBSERVATIONS ON VITAMIN A DEFICIENCY IN DOGS

By A. M. Stimson, *Medical Director*, and O. F. Hedley, *Passed Assistant Surgeon, United States Public Health Service*

The results of deprivation of vitamin A in dogs has been reported apparently in but few instances. Steenbock and others (1) and Mellanby (2) have described the symptoms and lesions.

It seems proper therefore to add to this literature our observations on this condition made during experiments designed to determine whether deprivation of vitamin A increased susceptibility to streptococcal infections. The experiments were inconclusive in this respect; too few of the animals in either the test or control group presented definite evidence of such infection. Indeed, the element of streptococcal infection played so unimportant a part that it is believed that, apart from the exceptions which will be noted, the material here reported represents a well-controlled experiment in avitaminosis.

METHOD

Young puppies, representing for the most part the small terrier-like breeds, and averaging about 4 pounds in weight, were obtained from dealers. Some of these were placed for a few days on a general diet before being put on a strict regimen of either the A. D. diet (vitamin A deficient) or the stock diet rich in vitamins. The dogs were kept in individual cages, excluding the possibility of communication or transfer of food. Each had its individual, tared feeding vessel with projecting base to prevent overturning, in which the

weighed food was placed once daily. The uneaten food was weighed daily and a careful record kept. The dogs were observed daily, being allowed to run about the room one at a time so that disturbances of strength, locomotion, and behavior might be noted. They were weighed once a week. Water was supplied in abundance. The feces were examined for worm eggs; and when evidence of infestation was found, capsules of oil of chenopodium and castor oil were administered.

The formulæ for the diets are as follows:

A. D. Diet (vitamin A deficient)

	Grams
Rolled oats	66
Casein (A free)	10
Salt mixture (O&M)	4
Irradiated yeast	5
Cornstarch	15
	100 (containing 379 calories).

The oats and cornstarch were cooked for 1½ hours in a double boiler with a minimum of water, cooled, and the other ingredients added. Water was then added to make up to 379 grams Each gram of the mixture then contained 1 calorie

The powdered yeast was irradiated by exposure in a thin layer, with stirring, to the rays of a mercury vapor quartz lamp at 14 inches distance for 20 minutes.

Stock diet

	Grams
Whole wheat flour	380
Fresh lean beef	350
Whole milk powder	60
Cod-liver oil	30
Irradiated yeast	15
Sodium chloride	6
Calcium carbonate	9
	850 (containing 2,400 calories).

The whole wheat flour was cooked in a double boiler with little water for 1½ hours, cooled, the other ingredients added, and enough water to make up to 2,400 grams. Each gram then contained 1 calorie

The dogs were supplied with all they would eat of these mixtures.

RESULTS

This report deals with 12 dogs fed on the A. D. diet and 6 dogs fed on the stock diet.

Of the 12 test dogs, 10 developed unmistakable ocular symptoms attributable to dietary deficiency. Of the two remaining, one exhibited a transient corneal opacity during the second week of experiment, which cleared up without dietary change and was not attributed to dietary deficiency. This dog died of pneumonia in six weeks. The other dog in the series failed to develop any ophthalmia, although it lived 13 weeks on the diet.

The period at which ophthalmia developed varied greatly throughout the series, and more particularly among the different batches of dogs. The first batch of five dogs, which were fed for a few days on general diet and placed on the A. D. diet on January 15, 1932, consisted of vigorous puppies. They throve as well, in general, as the corresponding control dogs did on the stock diet for about three months. The periods at which ophthalmia developed among these five dogs were 11, 19, 20, 30, and 32 weeks, respectively.

The subsequent batches of dogs on which feeding was begun at different times from April 1 to June 17 were placed on the A. D. diet immediately on receipt and were, in general, inferior in vigor to the first batch from the start. Most of them failed to eat or gain weight well and they developed ophthalmia at periods of 6, 6, 6, 10, and 13 weeks. The two other dogs of these later batches failed to develop ophthalmia referable to vitamin deprivation, and it is possible that they did not live long enough.

It is convenient to ascribe the differences in the times of appearance of characteristic symptoms between the vigorous and puny batches to variations in the amounts of stored vitamin in their tissues. The fact that the vigorous dogs were additionally favored by a few days of general diet tends to support this view. On the other hand, the puny puppies were placed on the diet after the advent of warm weather, when all of the animals of both test and control groups showed a marked tendency to eat less and gain weight more slowly.

This failure of appetite (food consumed) was at first thought to be a premonitory symptom of the onset of ophthalmia, since it preceded it with fair regularity by about two weeks. It was found, however, that the control dogs exhibited the same symptom at about the same time.

The ophthalmia, although appearing at such varying periods, ran much the same course in all animals which developed it. After two or three days, during which an excess of secretion from the eyes might be noted, the conjunctiva would be observed to be red, swollen, and perhaps everted. At the same time, or at most within a day or two, the cornea would have a hazy or even ground-glass appearance. This condition progressed within another day or two to destructive ulceration, going on even to perforation in some instances. The condition was usually unilateral at the beginning and remained so in half of the cases, although early death may have forestalled its extension to the other eye in some instances.

A striking feature of this ophthalmia is its sudden, almost explosive development. A dog apparently in good health and spirits on one day may show a deep corneal ulcer three days later. This suggests a steep threshold for the development of the ocular symptoms and may be

taken to imply profound but undetectable physiological changes which must have gone before.

Symptoms other than the characteristic ophthalmia were inconstant and irregular among the test animals Disturbances of locomotion, referred to by other observers, were observed in a few dogs However, these were often transient and were matched by similar symptoms among the control animals Convulsions, or "fits," were observed occasionally in both groups One test dog had a tendency to carry the head to one side, which appeared to be due to weakness rather than spasm of the neck muscles; at the same time both carpal joints became subluxated due to the weight of the animal on weakened flexor muscles.

Among the puny animals especially, a tendency to upper respiratory involvement with nasal discharge was noted; but this may have been due to streptococcal inoculations.

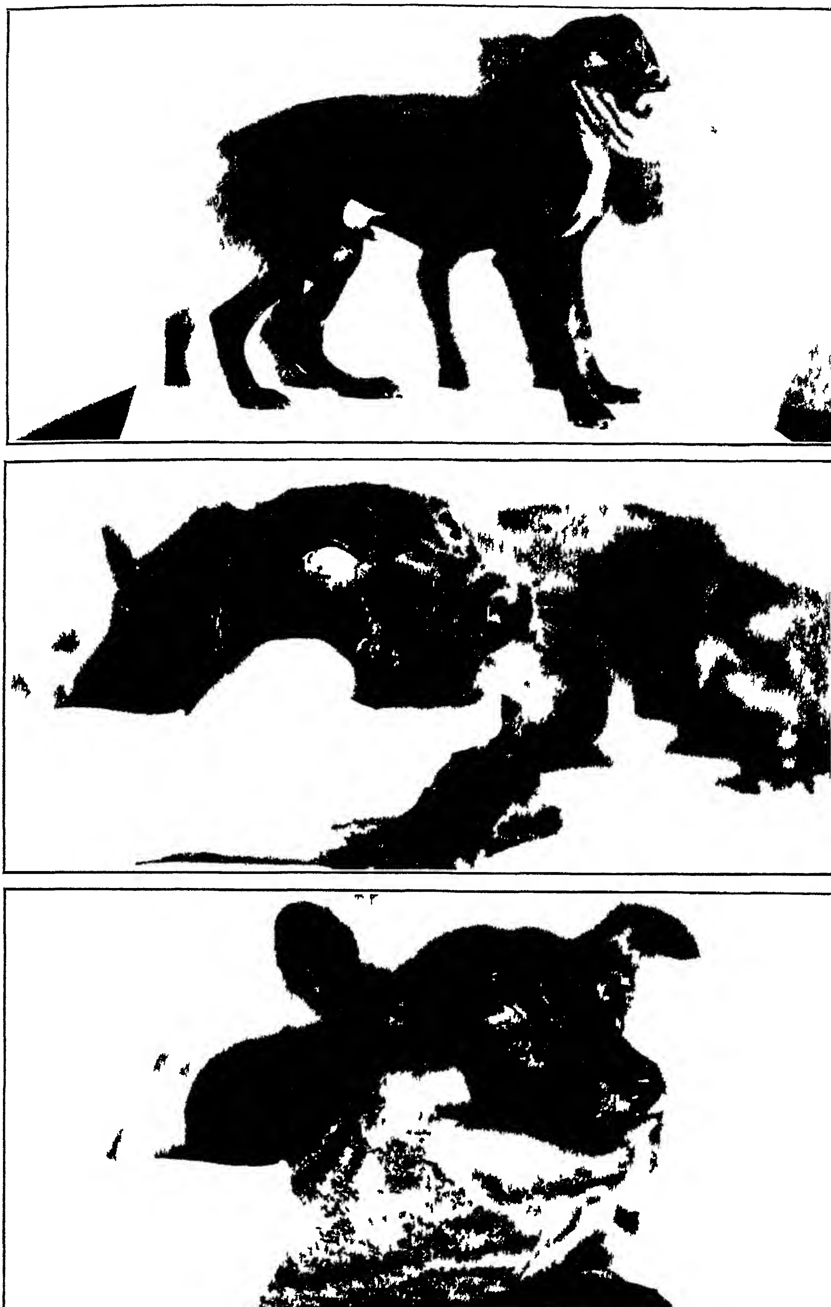
The test dogs, after a long period on the diet, frequently showed a tendency to foul mouth, not black tongue, and their teeth became covered with grayish yellow deposit about the bases. It was also noted that although the permanent teeth erupted in several animals, the corresponding deciduous teeth would remain in place alongside of them without being shed for abnormally long periods. This condition was confined to the test dogs, although the control animals also were on a soft diet affording no mechanical roughage to keep the teeth clean and to remove loosened teeth.

After the development of ophthalmia the test animals exhibited a marked falling off of appetite and condition, becoming thin and weak, their coats losing the normal luster. In a number of instances, however, marked eye lesions (Figures 1 and 2) occurred without notable impairment of the general condition.

Death occurred spontaneously in eight of the test animals, the other four being killed by gas at the end of the experiment. Death occurred in one dog from nasal hemorrhage of unexplained origin. In another, broncho-pneumonia supervened. In the remainder, necropsy failed to reveal any specific cause of death beyond malnutrition.

Only four spinal cords were examined microscopically. One of these was reported normal in appearance. The lesions in the remainder varied from slight tigrolysis in the anterior horn cells of the cervical region and moderate to marked edema of the white matter to diffuse noninflammatory degeneration of the white tracts. No consistent nervous symptoms were noted in the corresponding animals—nothing more than weakness or a tendency to be unsteady on the legs and to fall over easily.

In one animal a therapeutic test of the specificity of the eye lesions was made. After the development of opacity of the cornea on one side, cod liver oil was administered in large doses, 120 c c in 11 days.



Upper Photograph taken during 23d week on vitamin A deficient diet Note extensive eye involvement contrasted with very fair general condition, alertness, and glossy coat Loss of general health followed shortly *Center* Same dog Note extensive involvement of right cornea and evidence of suppuration, also beginning process in left eye, with ground glass appearance of cornea *Lower* Ophthalmia in a puny dog occurring during 8th week on vitamin A deficient diet Note opacity of right cornea and discharge from that eye Left eye not yet involved

The eye symptoms cleared up promptly and failed to recur during the life of the animal, which was terminated by gassing some five months later. This is an example of the storage power of the tissues for vitamin A.

Among the six control animals no instance of ophthalmia occurred. While convulsions and fits of excitement were occasionally noted, the animals remained generally in good condition throughout the experiment. One died spontaneously with post-mortem signs of asphyxia, without, however, any obstruction being found. The remainder of the group were killed at the end of the test and exhibited no significant pathology.

SUMMARY AND CONCLUSIONS

The effects of feeding 12 dogs on a diet markedly deficient in vitamin A have been described. These were checked by observing six dogs fed on an adequate diet. Ten of the test dogs developed characteristic ophthalmia after widely varying periods of time. Other symptoms were inconstant and inconclusive except a terminal loss of appetite, weight, and strength, frequently followed by death.

A noteworthy feature of the results was the sudden development of the ophthalmia without significant premonitory symptoms. It suggests that in A avitaminosis, profound physiological changes may occur without being detected by available means. The experiments further indicate that great individual differences exist in susceptibility to vitamin A deprivation. While this is conveniently ascribed to variations in storage of the vitamin in the tissues, other possible factors, such as general state of vigor and the influence of season, have not been ruled out.

REFERENCES

(1) Steenbock, Nelson, and Hart.: Amer. Jour. Physiol., 1921, 58: 14.
(2) Mellanby, Edw.: Brain, Sept., 1931, *54*: 247–290.

COURT DECISION RELATING TO PUBLIC HEALTH

Compliance by municipality with State health department's order designed to correct sewage pollution of stream.—(Ohio Supreme Court; State ex rel Southard, Director of Health, *v.* City of Van Wert et al., 184 N. E. 12; decided Dec. 21, 1932.) In 1920 the then State health commissioner, with the approval of the public health council, ordered the city of Van Wert to install works and means satisfactory to him which would so dispose of the city's sewage as to correct and prevent the pollution of a certain creek. In the instant proceeding, the State health director averred that the order had not been complied with and sought a writ of mandamus to compel compliance. The city

defended on the ground that it had no funds with which to carry out the order and could not levy taxes so to do without violating certain statutory and constitutional limitations. The city also recited the fact that in this connection the voters had rejected a proposition for issuing bonds and making a levy of taxes. In holding mandatory the order of the State health authorities and sustaining a demurrer interposed to the answer filed by the city, the supreme court stated, in part, as follows:

Current expenses must be secondary to levies to meet mandatory requirements, such as discharge of bonded indebtedness, interest thereon, and also compliance with orders of the State department of health issued under general State laws, which we hold to be mandatory. If current expenses of the municipality can not be provided for within the 15-mill limitation and provision also be made for payment of bonds required to be issued in order to comply with the orders of the State department of health, then the current expenses must yield and the municipality take advantage of section 5625–15, Gen. Code, as authorized by the provisions of the constitutional amendment, sec. 2, Art. XII, to secure funds for current expenses.

That the legislature may impose upon a municipality the performance of certain duties of a public nature and require it either to raise moneys for that purpose or to devote to it revenues already on hand is well recognized. [Citations.]

For the reason that the answer does not affirmatively show that the levy necessary to pay the bonds which must be issued to comply with the order of the State board of health in financing the construction of the sewage plant, together with the mandatory levies, would result in exceeding the limitations of the constitution or of the general code, the demurrer to the second, third, and fourth defenses of the answer must be sustained.

DEATHS DURING WEEK ENDED APRIL 8, 1933

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Apr. 8, 1933	Corresponding week, 1932
Data from 85 large cities of the United States:		
Total deaths	8, 299	8, 921
Deaths per 1,000 population, annual basis	11. 6	12. 7
Deaths under 1 year of age	573	649
Deaths under 1 year of age per 1,000 estimated live births [1]	50	54
Deaths per 1,000 population, annual basis, first 14 weeks of year	12. 2	12. 7
Data from industrial insurance companies:		
Policies in force	68, 561, 926	73, 744, 524
Number of death claims	13, 353	15, 945
Death claims per 1,000 policies in force, annual rate	10. 2	11. 3
Death claims per 1,000 policies, first 14 weeks of year, annual rate	11. 1	10. 5

[1] 1933, 81 cities; 1932, 80 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge, of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended April 15, 1933, and April 16, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended April 15, 1933, and April 16, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Apr. 15, 1933	Week ended Apr. 16, 1932	Week ended Apr. 15, 1933	Week ended Apr. 16, 1932	Week ended Apr. 15, 1933	Week ended Apr. 16, 1932	Week ended Apr 15, 1933	Week ended Apr. 16, 1932
New England States:								
Maine		2	3	22	5	208	1	0
New Hampshire		2				15	0	0
Vermont					50	39	0	0
Massachusetts	28	36	1	9	426	611	2	3
Rhode Island	4	3		3		161	0	0
Connecticut	5	8	7	17	242	156	1	1
Middle Atlantic States:								
New York	53	99	[1] 28	[1] 35	3,771	2,066	8	9
New Jersey	19	30	8	48	1,454	529	4	1
Pennsylvania	85	73			1,403	1,648	8	10
East North Central States:								
Ohio	38	61	154	193	811	2,818	1	9
Indiana	17	27	20	43	141	72	1	8
Illinois [2]	32	80	30	69	691	957	13	11
Michigan	14	26	10	32	1,363	1,754	2	9
Wisconsin	4	10	49	113	462	1,672	0	1
West North Central States:								
Minnesota	7	8		5	844	38	0	2
Iowa	11	6			30	2	0	0
Missouri	19	25	5	15	257	47	1	1
North Dakota	4	2			50	60	0	0
South Dakota	3	1	1		14	14	0	1
Nebraska	5		15	13	29	1	4	1
Kansas	7	9	1	6	359	460	1	3
South Atlantic States:								
Delaware	2	1	2	1	6	1	0	0
Maryland [3]	8	14	6	152	16	40	3	2
District of Columbia	5	5	2	2	8	2	2	0
Virginia	5				406		0	2
West Virginia	9	11	8	278	177	314	0	3
North Carolina [2]	9	12	11	88	653	710	0	1
South Carolina	14	8	376	1,871	288	127	0	0
Georgia [2]	8	12	90	188	128	34	2	0
Florida [2]	10	3	8	6		6	2	0
East South Central States:								
Kentucky	5	8	26	330	144	72	2	3
Tennessee	14	10	70	1,010	56	104	4	3
Alabama [2]	14	12	37	157	82	45	4	3
Mississippi	4	8					0	3
West South Central States:								
Arkansas	9	5	24	71	252	2	0	0
Louisiana [2]	10	31	24	13	38	103	1	0
Oklahoma [4]	6	13	34	172	95	44	2	0
Texas [2]	49	21	118	133	1,263	328	3	1

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended April 15, 1933, and April 16, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Apr. 15, 1933	Week ended Apr. 16, 1932	Week ended Apr. 15, 1933	Week ended Apr. 16, 1932	Week ended Apr. 15, 1933	Week ended Apr. 16, 1932	Week ended Apr. 15, 1933	Week ended Apr. 16, 1932
Mountain States:								
Montana [5]		2	6	2	39	166	0	0
Idaho [5]		1		3	20		0	0
Wyoming				2	5	6	0	0
Colorado	4	3	37		1	166	0	1
New Mexico	21	11	2	54	6	89	0	1
Arizona			5	18	66	3	1	0
Utah [3]		5			5	1	1	0
Pacific States:								
Washington	4	9		3	43	341	0	1
Oregon	1	2	44	65	76	250	0	0
California	49	80	55	88	1,220	627	1	0
Total	615	798	1,317	5,360	17,495	16,909	75	94

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Apr. 15, 1933	Week ended Apr. 16, 1932	Week ended Apr. 15, 1933	Week ended Apr. 16, 1932	Week ended Apr. 15, 1933	Week ended Apr. 16, 1932	Week ended Apr. 15, 1933	Week ended Apr. 16, 1932
New England States:								
Maine	0	0	24	41	0	0	1	0
New Hampshire	0	1	20	30	0	0	0	0
Vermont	0	0	14	9	0	4	0	0
Massachusetts	0	3	375	585	0	0	2	3
Rhode Island	0	0	28	68	0	0	0	0
Connecticut	0	0	140	93	0	0	0	3
Middle Atlantic States:								
New York	2	1	1,085	1,662	0	12	7	2
New Jersey	2	0	223	315	0	0	0	1
Pennsylvania	1	3	1,141	881	0	0	3	14
East North Central States:								
Ohio	3	1	1,098	490	5	17	9	7
Indiana	1	0	188	101	0	18	3	1
Illinois [2]	2	3	540	399	8	9	6	17
Michigan	0	1	617	415	2	6	7	4
Wisconsin	1	0	148	82	8	1	0	1
West North Central States:								
Minnesota	0	0	89	133	0	0	0	0
Iowa	0	0	34	66	30	44	1	5
Missouri	0	0	81	85	0	4	0	1
North Dakota	0	1	8	23	0	9	0	2
South Dakota	0	0	36	3	0	1	5	3
Nebraska	0	0	20	24	2	3	2	0
Kansas	0	0	49	46	3	5	1	4
South Atlantic States:								
Delaware	0	0	14	17	0	0	1	0
Maryland [3]	0	0	103	134	0	0	3	4
District of Columbia	0	0	15	21	0	0	0	0
Virginia	0		42		0		1	
West Virginia	0	0	12	24	0	0	5	2
North Carolina [2]	0	1	59	48	0	4	15	5
South Carolina	2	0	4	8	0	0	5	7
Georgia [2]	0	0	10	5	0	2	5	9
Florida [2]	0	0	1	1	0	0	2	2
East South Central States:								
Kentucky	0	0	36	92	0	16	3	4
Tennessee	1	0	36	32	0	10	3	7
Alabama [2]	1	1	5	13	1	15	4	8
Mississippi	0	0	6	9	0	19	7	3
West South Central States:								
Arkansas	0	0	4	7	2	25	1	1
Louisiana [2]	0	1	7	9	0	3	6	12
Oklahoma [4]	0	0	21	12	2	20	0	2
Texas [2]	1	1	64	27	20	29	9	5
Mountain States:								
Montana [5]	0	0	9	20	0	1	1	3
Idaho [5]	0	0	5	1	1	1	0	0
Wyoming	0	0	5	11	0	3	1	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended April 15, 1933, and April 16, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Apr. 15, 1933	Week ended Apr. 16, 1932	Week ended Apr. 15, 1933	Week ended Apr. 16, 1932	Week ended Apr. 15, 1933	Week ended Apr. 16, 1932	Week ended Apr. 15, 1933	Week ended Apr. 16, 1932
Mountain States—Continued.								
Colorado	1	0	20	35	0	0	0	0
New Mexico	0	0	11	10	3	0	0	3
Arizona	0	0	7	7	0	0	0	0
Utah [3]	0	0	6	5	0	0	1	0
Pacific States:								
Washington	3	0	36	37	8	86	2	1
Oregon	0	0	22	12	4	28	1	4
California	3	3	157	168	32	22	3	7
Total	24	21	6,675	6,316	131	417	126	157

[1] New York City only.
[2] Typhus fever, week ended Apr. 15, 1933, 15 cases: 1 case in Illinois, 1 case in North Carolina, 4 cases in Georgia, 1 case in Florida, 6 cases in Alabama, 1 case in Louisiana, and 1 case in Texas.
[3] Week ended Friday.
[4] Figures for 1933 are exclusive of Oklahoma City and Tulsa, and for 1932 are exclusive of Tulsa only.
[5] Rocky Mountain spotted fever, week ended Apr. 15, 1933, 5 cases: 3 cases in Montana, and 2 cases in Idaho.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of monthly State reports is published weekly and covers only those States from which reports are received during the current week.

Arizona	4	16	23		146		0	88	1	2
District of Columbia	1	18	7		17	1	0	87	0	2
Maine	1	6	10		7		0	60	0	5
New York	12	290		5	17,492		4	4,948	0	32
North Carolina	5	64	332		2,220	28	2	198	10	15
North Dakota	7	18	44		276		0	76	7	1
Ohio	6	154	464	1	3,109		3	4,159	91	16
Wyoming		5	1		15		0	37	0	8

March, 1933

	Cases
Botulism:	
New York	1
Chicken pox:	
Arizona	120
District of Columbia	191
Maine	150
New York	4,845
North Carolina	922
North Dakota	69
Ohio	2,902
Wyoming	19
Diarrhea and enteritis:	
Ohio	13
Dysentery:	
Arizona	1
New York	5
Food poisoning:	
Ohio	12
German measles:	
Arizona	3
Maine	34
New York	219
North Carolina	20
Ohio	80
Lead poisoning:	
Ohio	6
Lethargic encephalitis:	
New York	17
North Dakota	1
Ohio	2
Mumps:	
Arizona	138
Maine	204
North Dakota	5
Ohio	388
Wyoming	3
Ophthalmia neonatorum:	
New York	3
North Carolina	1
Ohio	86
Paratyphoid fever:	
New York	4
North Carolina	1
Ohio	1
Puerperal septicemia:	
Ohio	2
Rabies in animals:	
Maine	11
New York [1]	5
Rocky Mountain spotted fever:	
Wyoming	4
Septic sore throat:	
Maine	1
New York	38
North Carolina	15
Ohio	453
Wyoming	5
Tetanus:	
New York	6
Trachoma:	
Arizona	53
North Dakota	9
Ohio	3
Trichinosis:	
New York	18
Tularaemia:	
District of Columbia	1
North Carolina	9
Undulant fever:	
Arizona	1
New York	22
North Carolina	2
North Dakota	1
Ohio	7
Vincent's angina:	
New York [1]	83
Vincent's infection:	
North Dakota	11
Whooping cough:	
Arizona	38
District of Columbia	16
Maine	82
New York	2,537
North Carolina	481
North Dakota	3
Ohio	508
Wyoming	12

[1] Exclusive of New York City.

WEEKLY REPORTS FROM CITIES

City reports for week ended April 8, 1933

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Maine:											
Portland	0	------	0	0	3	1	0	1	0	8	23
New Hampshire:											
Concord	0	------	0	0	1	2	0	1	0	0	8
Manchester	0	------	0	0	0	2	0	0	0	0	7
Nashua	0	------	0	3	0	3	0	0	0	0	------
Vermont:											
Barre	0	------	0	0	0	0	0	1	0	7	3
Burlington	0	------	0	0	0	3	0	0	0	0	6
Massachusetts:											
Boston	4	------	0	182	24	86	0	19	1	62	252
Fall River	0	------	0	3	2	10	0	3	0	13	25
Springfield	1	------	1	0	1	13	0	0	0	9	27
Worcester	0	------	0	4	7	27	0	1	0	6	63
Rhode Island:											
Pawtucket	1	------	0	0	0	1	0	0	0	0	------
Providence	2	------	0	0	4	13	0	3	0	23	65
Connecticut:											
Bridgeport	0	3	2	45	2	13	0	0	0	2	32
Hartford	0	------	0	4	2	28	0	1	0	1	31
New Haven	0	------	1	2	4	12	0	1	0	8	50
New York:											
Buffalo	6	------	3	53	16	89	0	10	0	42	157
New York	78	23	12	2,400	172	421	0	74	3	104	1,591
Rochester	1	------	1	0	5	49	0	3	0	6	82
Syracuse	0	------	0	0	9	45	0	2	0	11	73
New Jersey:											
Camden	2	1	1	2	6	18	0	3	0	0	33
Newark	0	7	1	531	7	35	0	6	0	27	117
Trenton	0	------	0	27	9	16	0	6	0	4	47
Pennsylvania:											
Philadelphia	6	2	2	149	43	139	0	24	0	8	490
Pittsburgh	3	5	6	1	16	57	0	7	0	27	153
Reading	0	------	0	48	2	9	0	1	0	7	14
Scranton	0	------	------	1	------	20	0	------	0	0	------
Ohio:											
Cincinnati	4	------	3	11	12	41	0	10	0	0	138
Cleveland	7	50	0	2	9	259	0	13	2	23	160
Columbus	1	1	1	40	4	14	0	7	0	0	76
Toledo	5	1	0	403	4	113	0	5	0	3	63
Indiana:											
Fort Wayne	2	------	0	0	1	14	0	0	1	0	16
Indianapolis	0	------	1	86	14	16	0	3	0	10	------
South Bend	0	------	0	4	2	3	0	2	0	1	22
Terre Haute	0	------	0	1	0	9	0	0	0	0	11
Illinois:											
Chicago	4	6	10	401	60	338	0	46	2	14	664
Cicero	1	------	0	0	0	6	0	0	0	0	3
Springfield	1	3	0	2	1	6	0	0	0	0	15
Michigan:											
Detroit	9	3	2	634	23	207	0	12	1	123	249
Flint	0	7	0	338	1	9	0	1	0	2	23
Grand Rapids	0	------	0	4	2	7	0	1	0	24	34
Wisconsin:											
Kenosha	0	------	0	0	0	3	2	0	0	7	3
Madison	1	------	------	164	------	1	0	------	0	0	------
Milwaukee	0	3	2	3	2	38	0	3	0	29	96
Racine	0	------	0	1	1	6	0	0	0	11	11
Superior	0	------	0	0	0	0	0	0	0	9	5
Minnesota:											
Duluth	0	------	1	2	2	0	0	1	0	25	26
Minneapolis	1	------	0	209	6	31	0	3	0	27	104
St. Paul	0	------	0	825	7	19	0	1	0	92	64
Iowa:											
Des Moines	5	------	------	0	------	7	0	------	0	0	42
Sioux City	------	------	------	------	------	------	------	------	------	------	------
Waterloo	0	------	------	0	------	1	0	------	0	0	------
Missouri:											
Kansas City	1	------	1	173	10	32	0	8	0	0	95
St. Joseph	1	------	0	24	2	1	0	0	0	2	13
St. Louis	10	------	1	23	6	18	0	12	0	1	171
North Dakota:											
Fargo	0	------	0	4	0	1	0	1	0	0	5
Grand Forks	0	------	0	0	0	5	0	0	0	0	------

City reports for week ended April 8, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
South Dakota:											
Aberdeen	0			0		2	0		0	0	
Sioux Falls	0		0	3	0	0	0	0	0	0	6
Nebraska:											
Omaha	3		0	22	5	4	0	2	0	1	48
Kansas:											
Topeka											
Wichita	0		0	3	3	4	0	1	0	2	32
Delaware:											
Wilmington	0		0	4	6	8	0	2	0	3	26
Maryland:											
Baltimore	5	4	1	5	22	84	0	13	2	28	226
Cumberland	0		0	0	3	0	0	0	0	0	17
Frederick	0		0	0	0	0	0	1	0	0	5
District of Columbia:											
Washington	3		0	6	8	12	0	8	0	3	171
Virginia:											
Lynchburg	0		2	4	0	4	0	1	0	0	12
Norfolk	0		0	0	5	7	0	1	0	6	42
Richmond	1		1	2	3	6	0	5	1	0	38
Roanoke	0		0	109	0	5	0	3	0	5	22
West Virginia:											
Charleston	0		0	1	0	3	0	0	0	0	17
Huntington	1			8		3	0		0	1	
Wheeling	0		0	15	1	0	0	2	0	6	9
North Carolina:											
Raleigh											
Wilmington	0		0	185	0	1	0	1	0	0	8
Winston-Salem	2	1	0	1	3	3	0	1	0	0	9
South Carolina:											
Charleston	1	21	2	0	1	0	0	0	0	4	18
Columbia	0		1	0	4	0	0	1	0	0	17
Greenville	0		0	15	1	0	0	4	0	0	16
Georgia:											
Atlanta	1	11	0	32	9	1	0	2	0	14	94
Brunswick											
Savannah	0	28	0	0	2	1	0	1	0	0	26
Florida:											
Miami	2		0	0	0	0	0	2	0	4	34
Tampa	4	2	1	0	3	0	0	0	0	7	30
Kentucky:											
Ashland	0		0	30	0	0	0	0	0	14	
Lexington	0		0	5	4	2	0	3	0	2	16
Louisville	1	1	1	5	11	24	0	4	1	1	75
Tennessee:											
Memphis	4		0	20	9	3	0	6	0	7	60
Nashville	0		2	1	0	1	0	2	0	1	47
Alabama:											
Birmingham	1	2	3	5	3	0	0	3	1	8	73
Mobile	1		1	14	2	0	0	1	0	0	22
Montgomery	0	1		0		0	0		0	6	
Arkansas:											
Fort Smith	0			0		0	0		0	1	
Little Rock	0		0	85	1	0	0	0	0	0	
Louisiana:											
New Orleans	8	8	2	5	16	6	0	6	8	4	136
Shreveport	0		0	2	2	0	0	1	0	0	44
Oklahoma:											
Tulsa	1			36		1	5		0	5	
Texas:											
Dallas	7	3	3		4	4	0	5	0	0	54
Fort Worth	2		0	48	9	3	0	2	0	0	39
Galveston	0		0	0	1	0	0	1	0	0	17
Houston	8		1	12	12	4	2	8	1	0	84
San Antonio	2		0	9	5	3	0	5	0	0	67
Montana:											
Billings	0		0	0	0	0	0	0	0	0	8
Great Falls	0		0	6	0	4	0	2	0	13	10
Helena	0		0	0	0	0	0	0	0	0	4
Missoula	0		0	0	0	4	0	0	0	0	2
Idaho:											
Boise	0		0	24	0	0	1	0	0	0	7
Colorado:											
Denver	3	29	1	3	13	12	0	3	0	2	73
Pueblo	0		0	0	2	1	0	0	0	2	7

City reports for week ended April 8, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
New Mexico:											
Albuquerque	1	-------	0	0	1	1	0	3	0	8	8
Utah:											
Salt Lake City	0	-------	0	12	1	5	0	2	0	23	26
Nevada:											
Reno	0	-------	0	0	0	1	0	0	0	0	3
Washington:											
Seattle	0	-------	-------	10	-------	16	0	-------	0	8	-------
Spokane	0	-------	-------	1	-------	3	5	-------	0	0	-------
Tacoma	1	-------	0	1	4	12	0	-------	1	0	32
Oregon:											
Portland	0	1	0	1	4	6	1	1	0	3	80
Salem	0	-------	-------	17	-------	0	0	-------	0	0	-------
California:											
Los Angeles	25	13	2	526	11	37	28	24	0	32	328
Sacramento	0	-------	0	4	3	0	0	6	4	35	35
San Francisco	1	2	0	1	6	6	0	10	0	51	150

State and city	Meningococcus meningitis		Poliomyelitis cases	State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				Missouri—Continued.			
Boston	1	0	0	St. Joseph	0	1	0
Springfield	1	0	0	St. Louis	1	0	0
Connecticut:							
Bridgeport	0	1	0	Maryland:			
				Baltimore	1	0	0
New York:				Georgia:			
Buffalo	2	0	0	Atlanta	1	1	0
New York	4	2	0				
				Tennessee:			
Ohio:				Memphis	2	0	0
Cleveland	1	0	0	Nashville	0	1	0
Indiana:							
Indianapolis	2	3	0	Texas:			
Illinois:				Dallas	1	1	0
Chicago	26	7	0				
Cicero	1	0	0	Utah:			
Springfield	2	1	0	Salt Lake City	1	0	0
Michigan:							
Detroit	2	2	0	California:			
Flint	0	0	1	Los Angeles	1	0	2
				Sacramento	1	0	0
Missouri:				San Francisco	1	0	0
Kansas City	2	0	0				

Lethargic encephalitis.—Cases: Providence, 1; Trenton, 1; Fargo, 1; Washington, 1.
Pellagra.—Cases: Charleston, S. C., 4; Atlanta, 1; Savannah, 4; Birmingham, 3; New Orleans, 1; Dallas, 2.
Typhus fever.—Cases: Savannah, 2.

FOREIGN AND INSULAR

ITALY

Communicable diseases—Four weeks ended September 18, 1932.—During the four weeks ended September 18, 1932, cases of certain communicable diseases were reported in Italy as follows:

Disease	Aug. 22-28		Aug. 29-Sept. 4		Sept. 5-11		Sept. 12-18	
	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected
Anthrax	57	48	69	57	68	47	35	28
Cerebrospinal meningitis	7	6	16	15	4	4	7	7
Chicken pox	53	42	42	40	45	34	66	35
Diphtheria and croup	304	183	402	205	393	240	437	233
Dysentery	38	20	59	30	77	36	57	26
Lethargic encephalitis					3	3	1	1
Measles	479	166	405	163	438	156	356	128
Poliomyelitis	36	29	30	24	28	21	35	28
Scarlet fever	331	132	327	133	307	122	419	185
Typhoid fever	1,367	575	1,405	647	1,632	683	2,019	774

PANAMA CANAL ZONE

Communicable diseases—January-February, 1933.—During the months of January and February, 1933, certain communicable diseases, including imported cases, were reported in the Panama Canal Zone and terminal cities as follows:

	January		February	
	Cases	Deaths	Cases	Deaths
Chicken pox	5		19	
Diphtheria	10		7	1
Dysentery, amebic		1	10	2
Dysentery, bacillary			2	
Leprosy				2
Malaria	203	3	80	5
Measles	23		13	
Mumps	1			
Pneumonia		30		32
Poliomyelitis	1			
Tuberculosis		27		39
Typhoid fever	3	2		
Whooping cough	2		1	

SPAIN

Vital statistics—1932.—The following table shows the birth and death rates in Spain during the year 1932.

Birth rate per 1,000 population	28. 34
Death rate per 1,000 population	16. 44
Deaths under 1 year per 1,000 live births	112
Stillbirths per 100 births	3. 18

Deaths from certain diseases were reported in Spain during the year 1932 as follows:

Disease	Number of deaths	Disease	Number of deaths
Bronchitis	19, 648	Scarlet fever	196
Cancer and other malignant tumors	15, 797	Smallpox	7
Diarrhea and enteritis	44, 744	Syphilis	634
Diphtheria	1, 121	Tuberculosis, respiratory	22, 173
Heart disease	47, 735	Tuberculosis, other forms	5, 877
Influenza	4, 941	Typhoid and paratyphoid fever	3, 100
Malaria	304	Typhus fever	7
Measles	3, 935	Whooping cough	1, 589
Nephritis	12, 987	Other causes	163, 157
Plague	10		
Pneumonia	39, 525	Total deaths, all causes	388, 895
Puerperal infections and septicemia	1, 408		

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Hygiene, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; D, deaths; P, present]

Place		Sept. 18–Oct. 15, 1932	Oct. 16–Nov. 12, 1932	Nov 13–Dec. 10, 1932	Dec. 11, 1932–Jan. 7, 1933	Week ended— January, 1933			February, 1933				March, 1933				April, 1933		
						14	21	28	4	11	18	25	4	11	18	25	1	8	15
China:																			
Amoy	C	34			6														
	D	12																	
Canton	C	17		1															
Hankow	C	4																	
Hong Kong	C	2																	
Kwantung Leased Territory—District of Port Arthur	C	1																	
Macao	C	1														1			
	D	1														1			
Nanking	C	12																	
Shanghai	C	35																	
Swatow	C	30	3																
Tientsin	C	1																	
Tsingtao	C	6																	
India	C	3,626	2,411	3,453	4,524	945	971	680	800	573									
	D	2,072	1,336	1,907	2,400	504	527	330	360	288									
Bombay	C		5				1						1						
Calcutta	C	62	69	53	54	27	25	28	30	14	35	41	24	50	53	93			
Chittagong	C										1					1			
India, French: Chandenagor	C								1	2									
Indo-China (see also table below):																			
Pnom-Penh	C	5			1												1		
Saigon and Cholon	C	1	1						2								1		
Philippine Islands:																			
Cebu Province	C	1									7	8	2	2					
Iloilo Province	C	16																	
	D	11																	
Leyte Province	C	4		7	80	24		31	55	21	7	26	24	23		1	2		9

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

[C indicates cases; D, deaths; P, present]

		Week ended—																	
Leyte Province	D	2		7	44	11		20	45	14	6	23	13	21		1	2		7
Manila	C	1																	
Samar Province	C	48	53	35	135		121												
	D	38	42	26	101		75												
Siam	C	1	1		1			1	1										
Straits Settlements: Singapore	C	1																	

Place		September, 1932	October, 1932	November, 1932			December, 1932			January, 1933			February, 1933		
				1-10	11-20	21-30	1-10	11-20	21-31	1-10	11-20	21-31	1-10	11-20	21-28
Indo-China (French) (see also table above):															
Cambodia [1]	C	6	4	1			1	1	3				9		1
	D	4	3	1			1		1				6		
Cochin-China [1]	C	18	10			1	2	3	3	1	4	2	9	2	1
	D	16	7			1	2	3	1	1	1		6	2	1

[1] Reports incomplete.

PLAGUE[1]

[C indicates cases; D, deaths; P, present]

Place		Sept. 18–Oct. 15, 1932	Oct. 16–Nov. 12, 1932	Nov. 13–Dec. 10, 1932	Dec. 11, 1932–Jan. 7, 1933	Week ended— January, 1933: 14	21	28	February, 1933: 4	11	18	25	March, 1933: 4	11	18	25	Apr. 1, 1933
Angola	C			P							P						
Argentina:																	
Cordoba Province	C				2			1		5						5	
Jujuy Province	C							10					6				
La Rioga Province	D		4														
Rosario	C															2	
Salta Province	C		7	12													
San Luis Province [2]	C			P													
Santa Fe	C				1												
Belgian Congo	C				1												
British East Africa (see also table below):																	
Tanganyika	D	10		1					2								
Uganda	C	95	192	194	141	13	18	16	11	11	7	14					
	D	91	189	169	134	13	18	16	11	10	7	14					
Ceylon: Colombo	C	5	9	11	4	3	1		1	4	1	3	2	11		1	1
	D	4	8	7	3	2			1	2	1	2	2	9		1	1
Plague-infected rats		3	5		4						3	1					
Chile: Antofagasta—Plague-infected rats		1															
Dutch East Indies:																	
Batavia	C														[3] 1		
West Java	C	418	502	610	1,152	333	362	363	271								
	D	403	502	608	745												
Ecuador. (See table below.)																	
Egypt:																	
Alexandria	C	4			2	1								1			
Assiout	C				6	1	2		1	1	2	1		4	2		2
Beheira	C	2															
Gharbieh	C	2															
Minieh	C	4	1												1	1	
France: Marseille	C				1												
Great Britain: Liverpool—Plague-infected rats		[4] 1															

[1] Including plague in the United States and its possessions.
[2] Several cases of plague with 1 death were reported at Quines, San Luis Province, Argentina, on Dec. 9, 1932.
[3] Imported.
[4] At dock where steamship City of London was berthed.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

[C indicates cases; D, deaths; P, present]

Place		Sept. 18–Oct. 15, 1932	Oct. 16–Nov. 12, 1932	Nov. 13–Dec. 10, 1932	Dec. 11, 1932–Jan. 7, 1933	Week ended— January, 1933: 14	21	28	February, 1933: 4	11	18	25	March, 1933: 4	11	18	25	Apr. 1, 1933
Hawaii Territory:																	
Hawaii Island—Hamakua—Kukaiau	C								1								
	D								1								
Plague-infected rats					2	1	1	4	1								
Paauilo—Plague-infected rats				1	11												
Maui Island—Makawao—																	
Plague-infected rats		1						1									
Omaopio—Plague-infected rats							1										
India	C	6,028	5,422	6,104	6,900	1,590	1,528	1,889	1,655	1,446							
	D	3,481	3,074	3,060	4,349	1,018	906	1,198	1,069	898							
Bassein	C	1	1						1			1	1	1	4	3	
Plague-infected rats		1	1	1	1				1	1	1						
Bombay	C	1	3									3		2	1	6	
Plague-infected rats		30	34	15	16	5	10	6	7	11	21	14	22	26	26	25	
Madras Presidency	C	343	266	546	446	132	168	113	95	95	93						
	D	153	92	197	249	48	53	35	34	43	32						
Rangoon	C		2	3	1				1		1		1	2			
Plague-infected rats		2				1					1		1	1			
Indo-China. (See table below.)																	
Iraq: Baghdad	C	1	3	1						1	1		1		1		
Madagascar. (See table below.)																	
Morocco	C			10	16							3	1	14	8	9	
Peru. (See table below.)																	
Senegal. (See table below.)																	
Siam	C	1	7	9	12	2		4	1	1	1	13	1	10	1		
South-West Africa.[5]																	
Syria: Beirut	C	4	9	12													
Union of South Africa: Orange Free State	C	P	P	P	P	1	1	1	1	1							
United States: California—San Benito County—Plague-infected ground squirrels						1											
On vessels:																	
S. S. Kingsborough at port in Argentina	C															1	
S. S. Patris at Beirut	C		3														

Place		October, 1932	November, 1932	December, 1932	January, 1933	February, 1933	March, 1933
British East Africa (see also table above): Kenya	C	7	5	8	6	11	-------
Ecuador	C	-------	-------	-------	1	-------	3
Indo-China	C	1	2	3	4	4	4
	D	1	2	3	2	4	4
Madagascar:							
Province—							
Ambositra	C	35	41	149	158	-------	-------
	D	34	35	125	146	-------	-------
Antisirabe	C	73	25	57	63	-------	-------
	D	73	25	56	61	-------	-------
Maevatanana	C	-------	8	9	2	-------	-------
Miarinarivo	C	19	35	37	75	-------	-------
	D	19	34	36	14	-------	-------
Moramanga	C	225	229	186	163	-------	-------
	D	208	223	183	159	-------	-------
Tamatave	C	1	1	1	-------	-------	1
	D	1	1	1	-------	-------	1
Madagascar—Continued.							
Province—Continued.							
Tananarive	C	178	209	186	198	-------	-------
	D	173	199	179	190	-------	-------
Peru	C	-------	10	12	4	18	-------
Department—							
Ancachs	C	-------	[6] 2	-------	-------	-------	-------
Libertad	C	1	[6] 2	-------	-------	-------	-------
Lima	C	5	8	-------	-------	-------	-------
Piura	C	-------	[6] P	-------	-------	-------	-------
Senegal:							
Dakar [7]	C	3	6	19	2	4	1
	D	2	4	17	2	4	-------
Louga [7]	C	9	-------	-------	-------	-------	-------
	D	6	-------	-------	-------	-------	-------

[5] 227 cases of plague with 53 deaths were reported in Ovamboland, South-West Africa, up to Dec. 17, 1932. Antiplague measures have been taken.
[6] Suspicious cases.
[7] Incomplete reports.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX

[C indicates cases; D, deaths; P, present]

Place		Sept. 18–Oct. 15, 1932	Oct. 16–Nov. 12, 1932	Nov. 13–Dec. 10, 1932	Dec. 11, 1932–Jan. 7, 1933	Week ended— January, 1933: 14	21	28	February, 1933: 4	11	18	25	March, 1933: 4	11	18	25	April, 1933: 1	8
Algeria:																		
Algiers	C	1	2	1	1													
Constantine Department	C														1			
Arabia—Aden	C		1	3	1				2			1						
Argentina:																		
Chaco Territory	C											P						
Jujuy Province	C		1															
Belgian Congo	C			122	88													
Belgium	C		1															
Bolivia: Potosi	C				5													
Brazil:																		
Parahyba—Joao Pessoa	C			P														
Pernambuco—Recife	C		7	4														
Porto Alegre (alastrim)	C	41	26	8	16			1										
British East Africa: Tanganyika	C	65	74	66	49	42	15	36	2	18	15							
British South Africa:																		
Northern Rhodesia	C		40		6									1				
Southern Rhodesia	C	1	27	1	1	14			11	22								
Canada:																		
Alberta	C			1														
Manitoba	C		2		13													
Ontario	C			3	5									3		2		
Toronto	C			3	3													
Saskatchewan	C	6		3	1			3	2	22		9		4		10		
Ceylon: Colombo	C			28	72	14	22	12	27	18	7	5	4	1	1	1		
China:																		
Amoy	C								1	1	1	2	1	1		1		
Canton	C	2	28	180	762	189	151	101	63	85	86	41	22	26	17	10	14	
	D		2	14	23	4		7	2		1							
Chemulpo	C									17								
Dairen	C			2	1	2		2										
Foochow	C	P	P	P	P				P		P		P					
Hong Kong	C			2	18	10	22	14	32	32	28	63	46	53	43	37	36	
Macao	C				P	1		1	1	2	2	2	2	2	2	2	5	

Nanking	C	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]				
Shanghai	C		5	13	23	14	6	12	9		17	9	2	16	7	8		
Swatow	C	1	4	8	7		10	5	7	9	8	2	2	3		9		
Chosen. (See table below.)																		
Colombia: Cali	D			1														
Dahomey	C	2	6		5	7		15		21	4	7						
Dutch East Indies	C	1	2						1									
Egypt:																		
Alexandria	C	17	23	77	583	237	231	192	327	301	300	195	147	104	82	59	32	12
	D	9	13	18	116	46	52	59	70	52	56	40	35	25	23	11	11	3
Cairo	C			1	8	4	14	14	5	6	9	9	1	7		2		
Gharbieh	C				37													
Port Said	C						1		1					1	2	3		3
Suez	C						1	1					4	1	2			
Gold Coast. (See table below.)																		
Great Britain:																		
England and Wales	C	59	116	72	79	18	16	14	18	25	20	22	9	15	23	15	18	
London	C	56	76	68	73	17	14	13	15	22	16	20	8	13	21	11	17	
London and Great Towns	C	53	110	71	76	18	16	14	18	24	20	22	9	13	22	14	17	
Greece. (See table below.)																		
Honduras:																		
Puerto Castilla	C	1		1										2				
Tegucigalpa	D														8	6		
Tela	C	2	2	1	2		1	3		3	1	2		1	2			
India	C	3,234	4,179	7,919	11,284	3,936	4,525	5,116	6,846	6,699								
	D	722	1,013	2,239	3,523	1,098	1,376	1,451	1,982	1,906								
Bassein	C									2	1	2	2	5	2	3		
	D										1		1	1	1	1		
Bombay	C	27	33	87	230	93	199	219	294	332	408	377	405	358	341	259		
	D	20	15	35	98	49	85	97	160	164	210	206	215	286	178	142		
Calcutta	C	22	53	103	301	119	259	205	378	322	399	533	383	209	392	160		
	D	14	24	47	213	65	200	154	253	263	213	355	316	188	281	314		
Cochin	C		1											2	2			
Karachi	C	1		14	25	6	11	15	13	8	15	13	11	29	22	23		
Madras	C	89	140	119	156	55	87	102	107	117	104	130	213	153	143	195		
Moulmein	C									1								
Negapatam	C	2	3	4	2		2	1		1		1			2			
Rangoon	C	1	3	2	3	2		1	2	1	6	3	10	3	2			
Tuticorin	C	19	12	13														
Vizagapatam	C				1													
India (French): Pondichery Territory	C	13		3	2													
Indo-China (see also table below): Saigon and Cholon	C	2	1		2						2		1		4	2		
Iraq:																		
Baghdad	C	6	10	31	13	2	3	3		2	1	1		1			1	
Basra	C	33	85	81	25	1	1	1	3	2		1				1	1	
Ireland: Belfast	C											1						
	D											1						
Japan:																		
Kobe	C													1	1			
Nagoya	C											1						
Osaka	C									1	1	1		1	1		1	

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths; P, present]

Place		Sept. 18–Oct. 15, 1932	Oct. 16–Nov. 12, 1932	Nov. 13–Dec. 10, 1932	Dec. 11, 1932–Jan. 7, 1933	Week ended— January, 1933			February, 1933				March, 193				April, 1933	
						14	21	28	4	11	18	25	4	11	18	25	1	8
Mexico:																		
Coahuila	C												1					
Juarez	C									3								
Mexico, D. F.	C	4	4	2		2		3	5	3	1	1						
Monterrey	C		1															
Saltillo	D		3	11	8	4				1	3			1		2		
San Luis Potosi	D		3		2													
Torreon	C	5	1															
Morocco. (See table below).																		
Nigeria	C	58	56	1,581	583	335			66		291	2	4					
Persia	C	189	404	341	216	28	29	37	14		14	6	9	4	12			
	D	94	166	150	82	14	7	18	2		3		1	1	1			
Peru. (See table below.)																		
Poland	C				1													
Portugal:																		
Lisbon	C	9	5	9	12		1	1	2	3								
Oporto	C	5	1	14	9		1	2	2	2	1	2		1		1		
Siam: Bangkok	D							1	1		1	1			2	2		
Sierra Leone	C			13	10		89		128		29							
Sudan (Anglo-Egyptian)	C		8				13		44	13	12	4	5	19	6	3	4	
Syria. (See table below.)																		
Turkey. (See table below.)																		
Union of Socialist Soviet Republics. (See table below.)																		
Union of South Africa:																		
Cape Province	C	P	P	P	P						P	P	P					
Orange Free State	C	P	P	P									P					
Transvaal	C			P	P													
Zanzibar	C										2							
On vessels.																		
S. S. Amassis at Alexandria	C					1												
S. S. British Engineer at Marseille	C			1														
S. S. Somersetshire at Suez	C						1											

S. S. British Splendour en route to Gibraltar	C			1														
S. S Jervis Bay en route to Southampton	C			1														
	D			1														
S. S. Star of Alexandria at Alexandria	C				1													
S. S. Kohistan at Aden from Basra	C			1														
S. S. Bahadur at Madras from Calcutta	C					1												
S. S. Volturno at Alexandria	C												1					
S. S. Arimondi at Massaoua	C												2					
S. S. Hatasu at Malta	C													1				
S. S. Talma at Hong Kong	C											1						
S. S. Karapara at Rangoon	C											1						
S. S. Nawab at Rangoon	C								1									
S. S. California at Liverpool	C															1		
S. S. Kalgan at Bangkok from Swatow	C														1			

Place		September, 1932	October, 1932	November, 1932	December, 1932			January, 1933			February, 1933			March, 1933		
					1–10	11–20	21–31	1–10	11–20	21–31	1–10	11–20	21–28	1–10	11–20	21–31
Indo-China (see also table above)	C	127	157	180	38	68	107	168	65	20	29	98	60			
	D	62	46	51	15	11	19	38	17	3	16	33	28			
Syria: Beirut	C			41	4	28	17	5	10	19	11	8		2	11	7

Place		September, 1932	October, 1932	November, 1932	December, 1932	January, 1933	February, 1933	March, 1933
Chosen	C					7	17	
Gold Coast	C		3					
Greece	C						3	55
Morocco	C	24	33	53	81	14	14	
Peru	C	166	75	67		38		
Turkey	C	13	13			5		
	D	4	1					
Union of Socialist Soviet Republics	C	786	641					

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER

[C indicates cases; D, deaths; P, present]

Place		Aug. 21–Sept. 17, 1932	Sept. 18–Oct. 15, 1932	Oct. 16–Nov. 12, 1932	Nov. 13–Dec. 10, 1932	Week ended— December, 1932: 17	24	31	January, 1933: 7	14	21	28	February, 1933: 4	11	18	25	March, 1933: 4	11	18	25
Algeria:																				
Algiers	C	34	11	7	2						1	2	1	1			30	24	35	39
Bone	C		2			1					1			1			1			
Constantine Department	C				3					1		2		1	3	34	26	21	32	
Argentina: Buenos Aires	C	1										6								
Bolivia (see table below).																				
British East Africa: Uganda	C		16	19	16		15	2		3	8	2	4	4	4	7				
Bulgaria	C	1			12	5				2						4	5	24		
Chile (see also table below):																				
Antofagasta	C			1									1		1					
Santiago	C	22	61	41	166	45	48	78	52			84	63	47	34					
China: Hankow	C									3						5				
Colombia: Cali	D		1		1															
Egypt:																				
Alexandria	C	5							1	1										
Beheira	C		21		2								40							43
Gharbieh	C	1	1															70		
Port Said	C	1	1	1	1															
Provinces	C	6	3					33	26	28			143				134		178	
Greece. (See table below.)																				
Guatemala. (See table below.)																				
Ireland: Belfast	C															1				
Irish Free State:																				
Cork County—																				
Bandon	C		1																	
Dublin	C		2																	
Kerry County—																				
Dingle	C	1																		
Killarney district	C			1	16	2	3													
Lithuania. (See table below.)																				
Mexico:																				
Mexico, D. F.	C	10	3	11	10	2	1					2		3	6	2		5	1	
San Luis Potosi	D																			1
Torreon	C	6			2															

Morocco	C	7	2		22	17	1	9	16	10	9	14	30	4	4	66	64	11	26	
Palestine	C	6	5	2	2			1		1						1	1	1		2
Persia	C	6	16	2	11	3	4	2	7	3	3	6	4	7	13	1	19	9	4	2
Peru. (See table below.)																				
Poland	C	26	120	63	65	32	11	55	54	40	68	74	95	86	77	94	93	91	93	
	D	2	9	13	6	4		3	1	6	9	4	7	6	4	5	5	8	6	
Portugal: Oporto	C		1																	
Rumania	C	17	9	7	121	66	66	43	79	59	89	71		71	62	80				
Tunisia: Tunis	C				1		9			4	6	25		1	20	8	5	2	10	24
Turkey. (See also table below): Istanbul	C	1	1	1		1		1	1			5				1				
Union of Socialist Soviet Republics. (See table below.)																				
Union of South Africa:																				
Cape Province	C	P	P	P	P	P	P	P	P	P	P	P		P	P	P	P			
Natal	C		P	P	P	P	P	P	P	P				P	P	P	P			
Orange Free State	C	P	P	P	P	P	P	P	P	P	P	P		P	P	P	P			
Transvaal	C				P			P	P	P	P	P								
Yugoslavia. (See table below.)																				
On vessel: S. S. Munplace at New Orleans from Progresso	C											1								

Place		September, 1932	October, 1932	November, 1932	December, 1932	January, 1933	February, 1933	March, 1933
Bolivia	C				4	29		
Chile: Coquimbo Province	C			60				
Greece	C	15	4		15	10	2	
Guatemala	C	9			3	6	9	
Lithuania	C	5		1	10	36	13	12

Place		September, 1932	October, 1932	November, 1932	December, 1932	January, 1933	February, 1933	March, 1933
Peru	C	50	81	75	111	81		
Turkey	C	6	11	15	14	23	11	
Union of Socialist Soviet Republics	C	2,639	1,727					
Yugoslavia	C			3	11	35	125	

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

YELLOW FEVER

[C indicates cases; D, deaths; P, present]

Place		Sept. 18–Oct 15, 1932	Oct. 16–Nov. 12, 1932	Nov. 13–Dec. 10, 1932	Dec. 11, 1932–Jan. 7, 1933	Week ended— January, 1933: 14	21	28	February, 1933: 4	11	18	25	March, 1933: 4	11	18	25	Apr. 1, 1933
Brazil:																	
Ceara State	C	1	1	1													
	D	1															
Parahyba State	D	1															
Pernambuco State	D	1															
Piauhy State	D				1												
French West Africa: Guinea	C		2	4													
	D		2	4													
Gold Coast	C										1		1				
	D										1		1				
Guinea (Portuguese): Bissagos Islands	C					43			1								
	D					13			1								
Senegal	C		8														
	D		5														
Bakel	C	6															1
	D	5															
Dagana	C														1		
	D														1		
Podor	C															1	
Upper Gambia	C	3															
	D	2															
Sudan (French): Keyes	C		4	2													
	D		4	2													

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UNITED STATES PUBLIC HEALTH SERVICE

HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst. Surg Gen. R. C. WILLIAMS, *Chief of Division*

The PUBLIC HEALTH REPORTS are issued weekly by the United States Public Health Service through its Division of Sanitary Reports and Statistics, pursuant to acts of Congress approved February 15, 1893, and August 14, 1912.

They contain: (1) Current information of the prevalence and geographic distribution of preventable diseases in the United States insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other communicable diseases throughout the world. (2) Articles relating to the cause, prevention, or control of disease. (3) Other pertinent information regarding sanitation and the conservation of the public health.

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PUBLIC HEALTH REPORTS

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THE PREVENTION OF ROCKY MOUNTAIN SPOTTED FEVER

A very few years ago it was thought that Rocky Mountain spotted fever occurred only west of the Mississippi River. However, in 1930 research workers of the Public Health Service discovered that this disease was also present in some of the Eastern States, particularly those of the Atlantic seaboard. So far the disease has not been recognized in the New England States.

Rocky Mountain spotted fever is transmitted to man by the bite of infected ticks. Several species of ticks are able to harbor the infection, but the two species responsible for the great majority of the human cases are the *Dermacentor andersoni*, or wood tick of the Northwest, and the *Dermacentor variabilis*, or common dog tick of the East. Apparently not many of the ticks are infected with spotted fever, but the disease in man is serious enough to warrant the practice of precautionary measures.

Ticks appear early in the spring, are most numerous during May, June, and July, and disappear rapidly in August. The tick season is a little earlier in the West than in the East.

When the ticks appear, they are unfed and are seeking some animal in order that they may attach themselves and suck blood. They crawl up on long grass and bushes and wait for some animal, wild or domestic, to pass. When the tick drops on an animal, including man, it does not start feeding at once but usually spends some time in searching for a suitable place. The hairy parts, especially along the back of the head or in the armpits, are often chosen by the tick. Experiments have shown that a previously unfed infected tick may attach to the body and feed for a few hours without transmitting the infection; but it then becomes highly infectious.

A vaccine has been prepared by the Public Health Service which is of value in the prevention of spotted fever.

There are three measures which we, as individuals, may use to prevent spotted fever: (1) Avoid ticks; (2) remove ticks from the person as early as possible; (3) be vaccinated.

On camping trips, if it is necessary to sleep in the open, care should be used in selecting a site for placing the bed, as ticks will crawl into a bed laid on the ground. Since ticks are usually most numerous where rodents are most abundant, areas well populated with rodents should be avoided. The safest camping ground is undoubtedly in standing timber where low vegetation is scanty. Proximity to trails and old

roads should be avoided. In sage-brush sections, avoid the sage brush. Avoid brushy areas along streams as camping grounds. The dog tick is far more likely to be present along the course of streams than is the wood tick.

Persons should be especially watchful when walking along trails. Ticks tend to concentrate on vegetation along the sides of trails and in the bushes along the edge of wooded areas. Similarly, vegetation along roadsides and grassy strips in the middle of little used roads are often very dangerous. It is especially desirable to watch the clothing when following trails or old roads.

In the prevention of tick bite, the first precaution is the wearing of such clothing as will prevent ticks from getting underneath. This may be accomplished to a considerable extent by wearing high boots, leggings, puttees, or socks that are worn outside the trousers legs. With such precautions taken, most ticks will crawl up the outside of the clothing and can be removed from the neck when contact with the skin makes their presence known. Passing the hand over the neck occasionally to feel for ticks is a good habit to acquire.

Ticks are far more likely to secure a hold on rough clothing than on clothing of smoother texture. There are advantages in both, however. Fewer ticks secure a hold on smooth clothing; but, on the other hand, on cloth with a heavy nap their movements are impeded and are necessarily much slower. If the legs of the trousers are carefully watched, most ticks can be picked off soon after they catch hold.

In spite of precautions, however, a certain number of ticks will reach the body through the various openings in the clothing. It is therefore important that the above precautions be supplemented by the examination of the inside of the clothing and of the body. Since ticks seldom attach immediately (unless late in the season), and are seldom infectious until after having been attached for a few hours, such examinations made twice each day (early afternoon and on retiring) should ordinarily be sufficient. In heavily tick-infested areas, however, or in sections known to be particularly dangerous, more frequent examinations should be made. When retiring, a complete removal of the clothing is desirable. Both clothing and body should be examined carefully and, if possible, any clothing not worn at night should be so placed that any undiscovered ticks will be unlikely to crawl from the clothing to the bed. If two or more persons are together, they should assist one another in the examination. If the person is alone, the back and other portions of the body that cannot be seen should be explored with the hands, paying particular attention to the hairy portions.

Ticks may be removed from man and domestic animals with the fingers, but a better plan is to use a pair of small forceps or tweezers. With these the tick may be seized by the head, close to the skin, and

easily removed. There is no danger of leaving the tick's head embedded in the skin. Care should be exercised against crushing the tick, as the contents of infected ticks are dangerous. After removing or handling ticks, the hands should be washed thoroughly with soap and water.

Two or three inoculations of the vaccine give a degree of protection usually sufficient to last through one tick season, but the immunity apparently is not permanent. Occasional cases of spotted fever have developed in vaccinated persons, but the vaccine apparently lessens the severity of the disease and seems to insure recovery. For its full protective value the vaccine should be taken at least 10 days before exposure to tick bite. The vaccine is of no value in the treatment of spotted fever.

TRENDS IN DIPHTHERIA MORTALITY

By Edward A. Lane, M.D., M.P H., *Director of Communicable Disease Control Westchester County (N.Y) Department of Health*

Diphtheria mortality statistics for the 10 States admitted to the death registration area up to and including 1900 were assembled in order to study recent trends in those areas. The earliest years for which such data were found to be available are as follows: Massachusetts, 1842; Vermont, 1857; Michigan, 1874; New Jersey, 1879; New Hampshire, 1884; Connecticut, 1885; New York, 1885; Maine, 1892; Rhode Island, 1894; and Indiana, 1900 (table 1).

Two periods were selected, namely, from 1895 to 1911 and from 1900 to 1927. The trend in the earlier period could not be compiled for Indiana because of insufficient data. It will be noted that the later period terminates for Maine with the year 1926, while that for Massachusetts extends to 1928. The two periods were selected because (1) diphtheria mortality statistics for Rhode Island and Indiana were not available prior to 1894 and 1900, respectively; (2) with lower rates in more recent years it seemed advisable to make the later period longer than the earlier in order more nearly to equalize the numbers of deaths in the two periods; and (3) the study being based upon Massachusetts statistics, the periods appeared to be most suited to the Massachusetts curve, at the same time permitting the inclusion of Indiana in the later period.

The mean death rates arranged for each period in ascending order of magnitude are as follows:

Mean diphtheria death rates per 100,000 population

State	Rate		Percent decrease	State	Rate		Percent decrease
	1895–1911	1900–1927			1895–1911	1900–1927	
Vermont	17 0	9 8	42	Massachusetts	34.2	20 7	39
Maine	20 9	12 3	41	Rhode Island	36 4	22 2	39
Michigan	21 5	18 5	14	New York	39 4	23 0	42
New Hampshire	24 4	15 5	36	New Jersey	44 5	23 8	47
Connecticut	29.9	19 2	36	Indiana		14 7	

Excluding Indiana, which appears only in the later period, the States occupy the same relative positions in both periods, except for Michigan and New Hampshire, which reverse their relative positions. The difference between maximum and minimum average rates for the earlier period is 27.5, as compared with 14.0 for the later, the decrease being due for the greater part to a fall of 20.7 in the maximum rate. The minimum rate shows a reduction of 7.2. Excepting Michigan the percentages showing decrease in the later period are strikingly similar.

The States with smaller and less dense populations occupy the more favorable positions. One is led in this connection to speculate as to whether the less favorable position occupied by Michigan in the later period reflects to any degree the expansion of the automotive industry with a resulting increase in urbanization in that State.

The trends for the two periods in descending order of magnitude are as follows:

State	1895–1911	1900–1927	State	1895–1911	1900–1927
New Jersey	–0 0359	–0 0229	Rhode Island	–0 0252	–0.0250
Vermont	– 0350	– 0168	Connecticut	– 0237	– 0216
Massachusetts	– 0341	– 0231	Michigan	– 0214	–.0049
New York	– 0276	– 0262	New Hampshire	– 0204	– 0252
Maine	– 0275	–.0241	Indiana		–.0109

The Michigan trend in the later period is the only one that is not of statistical significance, due to the very erratic course of the curve of diphtheria mortality in that State during that interval.

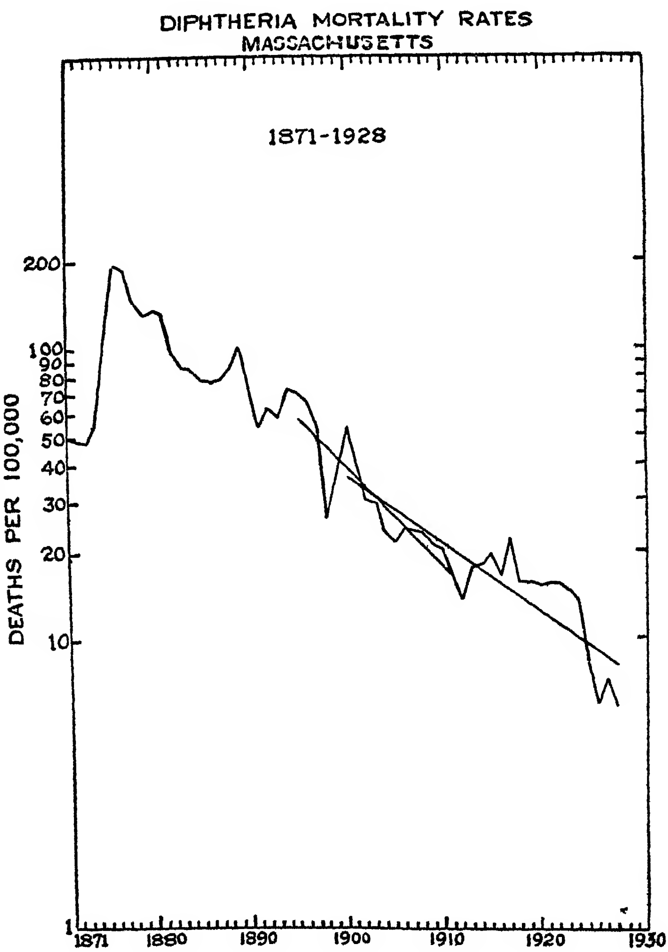
While all of the trends are descending, there is a decided tendency for them to slow up in the later period. The only two exceptions to this are New Hampshire which shows a more favorable decline, and Rhode Island with approximately the same trend in both periods.

Disregarding Michigan, because of lack of significance of its trend in the later period, and Indiana, the trend for which could not be computed for the earlier period because of insufficient data, the difference between the maximum and minimum trends in the earlier period is 0.0155 while in the later period it is 0.0096, showing a tendency toward greater uniformity. The falling off in the trends is shown to a greater degree in a comparison of the maximum trends, with a difference in favor of the earlier one of 0.0097. The minimum trend for the earlier period is but 0.0038 greater than that for the later one.

The relative positions of the several States with respect to degree of downward trend in the two periods are extremely variable. New

Hampshire, the only State with a greater trend in the later period, moves from 9th to 2nd position, while Vermont, which shows the most unfavorable change in trend, drops from 2nd to 8th place.

The continued decrease in the diphtheria death rates at a comparatively low level, coupled with the tendency of the trends to slow



up, suggests that the rates are approaching the point where the downward acceleration would naturally become retarded and the curves would tend to flatten out with progressively smaller reductions in rates.

TABLE 1.—*Diphtheria mortality rates per hundred thousand population for the ten States admitted to the United States death registration area up to and including 1900, from 1858 to 1931, as available*

Year	Massachusetts [1]	New Jersey [1]	Connecticut [2]	New Hampshire [2]	New York [2]	Rhode Island [2]	Vermont [2]	Indiana [3]	Maine [3]	Michigan [3]
1858	43.2	------	------	------	------	------	21.6	------	------	------
1859	46.2	------	------	------	------	------	39.4	------	------	------
1860	68.0	------	------	------	------	------	12.0	------	------	------
1861	89.0	------	------	------	------	------	155.8	------	------	------
1862	91.9	------	------	------	------	------	282.7	------	------	------
1863	181.7	------	------	------	------	------	416.6	------	------	------
1864	158.0	------	------	------	------	------	291.6	------	------	------
1865	92.4	------	------	------	------	------	130.1	------	------	------
1866	63.3	------	------	------	------	------	72.9	------	------	------
1867	45.0	------	------	------	------	------	34.5	------	------	------
1868	56.4	------	------	------	------	------	31.1	------	------	------
1869	54.0	------	------	------	------	------	31.1	------	------	------
1870	46.3	------	------	------	------	------	32.0	------	------	------
1871	49.8	------	------	------	------	------	19.9	------	------	------
1872	48.9	------	------	------	------	------	28.4	------	------	------
1873	47.2	------	------	------	------	------	34.1	------	------	------
1874	56.5	------	------	------	------	------	43.9	------	------	26.0
1875	113.5	------	------	------	------	------	49.0	------	------	26.5
1876	195.8	------	------	------	------	------	73.2	------	------	33.6
1877	186.1	------	------	------	------	------	134.0	------	------	43.7
1878	145.2	------	------	------	------	------	137.6	------	------	72.7
1879	130.3	108.8	------	------	------	------	125.5	------	------	110.0
1880	134.1	77.1	------	------	------	------	84.1	------	------	114.0
1881	131.0	97.2	------	------	------	------	92.9	------	------	145.3
1882	95.6	123.7	------	------	------	------	80.3	------	------	102.0
1883	86.0	94.7	------	------	------	------	59.2	------	------	75.7
1884	85.8	82.1	------	44.2	------	------	41.2	------	------	76.5
1885	78.0	117.0	73.0	41.9	81.2	------	58.0	------	------	74.5
1886	77.5	99.4	78.7	60.2	99.2	------	48.7	------	------	79.5
1887	78.7	113.7	67.1	70.9	113.2	------	80.6	------	------	68.3
1888	86.1	148.0	73.2	53.0	110.7	------	82.7	------	------	59.2
1889	101.3	111.8	97.7	79.6	98.9	------	92.3	------	------	61.0
1890	72.5	109.2	74.6	60.2	81.7	------	73.4	------	------	83.2
1891	53.0	117.4	75.8	56.9	82.6	------	59.8	------	------	63.4
1892	61.9	117.4	68.0	46.8	94.4	------	55.3	------	32.0	60.7
1893	58.0	108.9	58.6	25.7	93.0	------	45.1	------	23.0	55.5
1894	73.3	81.9	45.1	30.1	101.1	35.3	34.9	------	21.0	36.9
1895	71.1	87.5	47.5	32.5	75.1	88.5	24.0	------	29.8	34.5
1896	65.3	102.2	58.4	36.5	67.9	72.0	37.9	------	26.3	39.8
1897	54.2	78.3	47.1	35.9	59.6	57.5	48.1	------	41.8	32.0
1898	26.3	52.4	31.7	26.9	37.2	22.6	17.7	------	36.3	19.3
1899	38.1	41.9	26.0	25.2	38.9	20.5	14.1	------	21.9	18.2
1900	52.5	48.7	33.6	24.2	45.4	44.3	14.5	27.5	22.3	21.9
1901	40.9	35.5	32.1	21.7	40.5	40.4	14.2	20.5	18.3	20.4
1902	30.2	37.4	27.2	39.0	37.4	33.0	7.5	15.7	16.6	20.2
1903	29.6	37.1	25.7	24.4	38.8	41.2	12.8	17.1	16.6	27.0
1904	23.5	44.6	22.2	16.2	37.3	29.6	16.8	11.6	23.3	20.0
1905	21.6	32.6	23.1	18.2	28.0	25.2	16.8	13.5	15.4	18.3
1906	24.1	30.6	27.1	20.3	32.1	24.4	19.5	14.8	16.6	17.8
1907	23.8	28.1	23.3	22.3	30.3	22.8	9.3	14.0	16.9	15.6
1908	23.1	23.3	18.7	23.1	28.2	29.4	12.2	11.4	14.4	12.6
1909	21.0	25.9	19.4	16.7	25.8	18.9	8.1	12.6	15.3	14.3
1910	20.1	28.7	24.5	16.4	26.6	23.2	8.9	14.0	13.3	17.6
1911	16.4	21.7	21.6	15.4	21.1	24.8	6.4	13.8	10.3	16.3
1912	13.5	17.9	16.7	19.5	17.2	23.6	8.9	18.9	12.9	15.6
1913	17.6	21.0	18.8	13.7	19.3	23.8	5.6	18.7	11.7	22.0
1914	17.9	21.4	19.2	9.8	20.7	17.6	11.2	13.7	11.8	16.1
1915	19.5	17.4	15.7	7.4	17.8	16.4	10.9	10.6	11.3	10.9
1916	16.7	15.1	14.5	11.0	15.2	23.3	6.4	13.5	7.3	15.3
1917	21.8	14.8	17.3	10.7	10.7	17.3	7.3	15.3	9.4	25.0
1918	15.6	16.2	14.3	8.3	17.3	16.1	7.0	14.7	7.4	19.6
1919	15.5	18.1	17.3	8.5	19.9	19.5	4.2	10.9	6.1	21.3
1920	15.3	17.7	16.9	12.1	18.2	19.9	5.9	12.2	7.9	24.2
1921	15.6	18.3	12.4	16.6	16.1	12.1	8.2	23.9	14.1	25.0
1922	15.4	18.2	12.8	11.0	13.5	10.9	10.7	18.2	7.8	15.8
1923	14.6	14.0	12.7	9.1	9.3	11.3	10.7	14.3	6.4	17.5
1924	13.3	9.8	11.2	7.5	9.8	9.2	7.0	8.1	7.5	12.1
1925	8.0	9.3	8.2	6.6	8.9	6.6	7.3	5.6	4.5	9.1
1926	5.9	8.9	5.3	4.0	6.4	6.3	4.2	5.9	2.8	17.1
1927	6.3	11.4	5.8	4.0	8.6	8.8	2.5	7.5	3.8	11.7
1928	5.8	12.2	5.2	5.5	7.4	7.3	3.1	5.7	3.2	8.4
1929	6.0	11.7	3.8	5.0	5.3	6.6	2.8	4.8	1.7	10.6
1930	4.3	8.1	2.0	4.1	2.7	5.4	1.9	4.1	3.3	6.2
1931	3.0	2.9	.9	3.2	2.2	4.7	1.1	4.1	2.5	3.5

[1] Admitted to United States death registration area in 1880.
[2] Admitted to United States death registration area in 1890.
[3] Admitted to United States death registration area in 1900.

CORRELATION OF ANNUAL DEVIATIONS FROM TREND

The correlation of annual plus and minus deviations from the trend lines has been computed by the short formula, $r = \text{Sin}\frac{\pi}{2}\frac{(m-n)}{m+n}$. The number of observations was 28 (1900–1927) for each of the States except Maine, for which there were 27.

In the correlation table (Table 2) we note that, irrespective of significance of correlation, only 8 of the 45 correlations are negative; whereas, with nothing but chance operating, we would expect them to be about evenly divided—that is, with approximately 22 negative correlations. If we consider only the significant [1] correlations, we find but 2 of 19 to be negative. This indicates some significant factor correlating the annual deviations in a positive manner.

The highest positive correlation is between Massachusetts and Indiana (0.84). The States with the largest number of significant positive correlations are Connecticut and Michigan, each with 6, as follows:

Connecticut		Michigan	
Massachusetts	0.78	Indiana	0.63
Indiana	.65	Connecticut	.53
Michigan	.53	Massachusetts	.53
New York	.53	Rhode Island	.53
New Hampshire	.44	New Jersey	.44
Rhode Island	.44	New York	.44

The only two significant negative correlations are Maine and Rhode Island (−0.50) and Vermont and Rhode Island (−0.44).

TABLE 2.—*Correlation of annual deviations from trend lines of logs of diphtheria mortality rates*

	New Hampshire	Michigan	New Jersey	Maine	Rhode Island	New York	Connecticut	Indiana	Vermont
Massachusetts	−0.22	+0.53	+0.32	+0.17	+0.44	+0.32	+0.78	+0.84	+0.44
New Hampshire		+.10	−.10	+.60	+.22	+.32	+.44	+.10	−.22
Michigan			+.41	−.17	+.53	+.44	+.53	+.63	−.10
New Jersey				+.17	−.10	+.63	+.32	+.22	+.32
Maine					−.50	+.29	+.39	+.29	+.17
Rhode Island						+.10	+.44	+.65	−.44
New York							+.53	+.22	+.10
Connecticut								+.65	+.22
Indiana									+.10

Considering the nature of the disease in question and the wide extent of the territory embraced by the 10 States, the general group correlation suggests the influence of the larger, long range annual variations in meteorological conditions. In this connection it is inter-

[1] 0.45 and over indicates but 2 chances in 100 of such a chance correlation.

esting to note that the 10 States are all in about the same latitude, and this is even truer of their more densely populated portions. We know, moreover, that the excessively cold waves of winter originate in the West and Northwest and move eastward to affect a wide area of the country. The States here considered would all probably be affected to a similar degree by annual variations in the number and intensity of these more extensive and intense cold waves.

MORTALITY IN CERTAIN STATES DURING 1932, WITH COMPARATIVE DATA FOR RECENT YEARS [1]

For several years the United States Public Health Service has secured from State health departments current mortality data and has published death rates from important causes from as many States as could furnish the information. The rates are computed from preliminary reports and because of (*a*) some lack of uniformity in the method of classifying deaths according to cause, (*b*) some delayed death certificates, and (*c*) various other reasons, these preliminary rates cannot be expected to agree in all instances with final rates published by the Bureau of the Census. The final figures are based on a complete review and retabulation of the individual death certificates from each State. The preliminary rates given in the accompanying tables are intended to serve as a current index of mortality until final figures are available.

For purposes of comparison, the mortality rates for a few preceding years are given. These comparative rates are from the same source as are the current reports. Although final figures are often available for earlier years, the provisional figures are retained as being more comparable with current preliminary rates.

In table 1 the death rates from important causes for groups of States have been brought together. Nearly all of the rates are based on data from 28 States with a population of nearly 94 million. The detailed tables show rates for each State. The summary table includes for each cause every State that is included for all five years in the detailed tables. While the rates in this group of States may not be the same as those for the total registration area, it is highly probable that the trend in these rates will be comparable with the trend in the rates in the total registration area.

In considering the trend of the rates in the 5-year period shown in the tables it should be remembered that the mortality of both 1928 and 1929 was increased somewhat by the influenza epidemic of the

[1] From the Office of Statistical Investigations, U.S. Public Health Service.

winter of 1928–29. However, 1930 was free from any wide-spread epidemic and such epidemics as occurred in 1931 and 1932 were distinctly minor.

The death rate from all causes in the 27 States was 10.8 in 1932, as compared with 11 0 and 11.2 in 1931 and 1930, respectively. Of the 27 States, 20 showed a decline in 1932 from 1931 and 3 an increase in mortality, with 4 States remaining the same in both years.

In 26 States the infant mortality in 1932 was 58 per 1,000 live births as compared with 61 and 62 for 1931 and 1930, respectively. Considering the individual States, 22 of the 26 States with data available for both years showed a decrease in 1932 as compared with 1931, with increases in the other 4 States

In spite of the fact that 1932 represents the third year of the depression, the death rate from tuberculosis in the group of 28 States was only 60 per 1,000 as compared to 65 and 68 in 1931 and 1930, respectively. The amount of the decline was apparently about the same as has taken place in the past several years. Of the 28 States, 26 showed a decline and only 2 an increase; however, in 4 States the decline was very small.

Typhoid fever continued a rather steady decline, being 3.2 per 100,000 for 1932 as compared with 3.8 and 4 0 for 1931 and 1930, respectively. Twenty-two of the 28 States showed a decrease in 1932 as compared with 1931, 1 remained the same, and 5 had a higher rate in 1932 than in 1931. Diarrhea and enteritis likewise continued a steady decline. The deaths of children under 2 years of age amounted to 10.3 per 100,000 total population as compared with 14.0 and 17.9 in 1931 and 1930, respectively. Of the 27 States with available data, 26 showed decreases and only 1 increased in 1932 as compared with 1931.

Influenza, of apparently a mild form, was rather prevalent in the early spring months of 1932 and again in December, with the major portion of the mild epidemic coming in the last week of 1932 and the first week of 1933. A minor epidemic also occurred in 1931, but 1930 was free from any excess deaths from this cause. The deaths credited to influenza in 1932 amounted to 28 per 100,000 as compared with 26 and 19 in 1931 and 1930, respectively. All of these figures are distinctly less than those for 1928 and 1929, when a more severe epidemic occurred. Mortality from pneumonia was slightly less in 1932 than in preceding years, being 77 in 1932 as compared with 82 and 83 in 1931 and 1930, respectively. Considering both influenza and pneumonia the mortality of 105 per 100,000 in 1932 is slightly less than in 1931 (107) and slightly greater than in 1930 (102). The

mortality of 1928 and 1929 was definitely greater for both causes. Of the 28 States, 20 had higher influenza rates in 1932 than in 1931. Only eight had higher pneumonia rates in 1932 than in 1931, and in one other State the rate was the same.

Because of wave-like fluctuations that occur in the incidence of the communicable diseases of children, the comparison of one year with another means little as to the real trend of the mortality from these diseases. Diphtheria, which has been declining for many years, reached a new low level of 3.8 in these 28 States as compared with 4.0 and 4.6 in 1931 and 1930, respectively. The mortality from this much-dreaded disease was in 1932 less than the mortality from whooping cough.

The death rate from poliomyelitis was less in 1932 than in either of the two preceding years, being the same as in 1929. In 1930 the disease was epidemic in certain States, and 1931 marked a considerable epidemic in the Eastern States and particularly in New York City. Twenty-two of the 28 States had lower rates in 1932 than in 1931. Meningitis mortality was likewise small in 1932. Twenty-four of the 28 States showed decreases in 1932 as compared with 1931.

The death rate from diabetes was greater in 1932 than in any of the 5 years included in the table. In 21 of the 28 States there was an increase in 1932 as compared with 1931, while in 6 States there was a decrease, with the other State remaining the same in the two years.

Cancer continued its steady increase, the rate of 101 per 100,000 in 1932 being greater than in any other year included. Twenty of the 28 States increased in 1932 as compared with 1931 and 8 decreased.

Diseases of the heart continued to increase, 20 of the 26 States with available data having higher rates in 1932 than in 1931. The death rate from nephritis was about the same in 1932 as in 1931, but was less than in 1930 in the group of 27 States with available data. Of these States, 14 had a higher rate and 13 had a lower rate in 1932 than in 1931. In 25 States with available data on cerebral hemorrhage, the rate in 1932 was very slightly above that for the last two preceding years. In 13 of these States there was an increase in 1932 over 1931, in 11 a decrease, and in 1 the rate was the same for both years.

TABLE 1.—*Summary of mortality from certain causes in a group of States, 1928–32* [1]

Diseases (numbers in parentheses are from the International List of Causes of Death, fourth revision, 1929)	1932	1931	1930	1929	1928
	Death rate per 1,000 population				
27 States (population July 1, 1932, 92,110,000):					
All causes	10.8	11.0	11.2	11.8	13.0
	Deaths under 1 year per 1,000 live births				
26 States (live births, 1,520,808):					
Total infant mortality	58	61	62	66	74
20 States (live births, 1,235,370):					
All infant mortality except malformations and early infancy	26	28	28	32	35
	Deaths of mothers per 1,000 live births				
26 States (live births, 1,520,808):					
Maternal mortality	5.9	6.2	6.2	6.4	7.1
	Death rate per 100,000 population				
28 States (population July 1, 1932, 93,855,000):					
Typhoid fever (1, 2)	3.2	3.8	4.0	3.6	4.2
Measles (7)	1.5	2.5	2.9	2.4	4.7
Whooping cough (9)	4.2	3.6	4.3	5.8	5.2
Scarlet fever (8)	2.0	2.1	1.9	2.1	1.9
Diphtheria (10)	3.8	4.1	4.6	6.4	7.2
Acute anterior poliomyelitis (16)	.7	1.9	1.1	.7	1.1
Meningococcus meningitis (18)	1.3	2.1	3.1	3.9	2.4
Influenza (11)	28.0	25.7	19.1	52.8	43.2
Pneumonia, all forms (107–109)	77.4	82.0	83.2	92.5	100.2
Tuberculosis, all forms (23–32)	60.4	64.8	68.2	72.8	77.3
Cancer (45–53)	100.7	97.6	96.5	95.5	95.8
Diabetes mellitus (59)	21.7	20.3	19.1	18.8	19.4
27 States (population July 1, 1932, 92,110,000):					
Diarrhea and enteritis under 2 years (119)	10.3	14.0	17.9	16.5	19.0
Nephritis, all forms (130–132)	84.4	83.7	88.0	90.7	92.9
26 States (population July 1, 1932, 88,866,000):					
Diseases of the heart (90–95)	219.5	211.7	209.6	215.1	214.6
25 States (population July 1, 1932, 87,232,000):					
Cerebral hemorrhage, apoplexy (82, a, b)	79.3	78.5	78.9	79.6	81.9

[1] See tables 2 and 3 for names of States included for each disease. The District of Columbia is counted as a State.

TABLE 2.—*Mortality in certain States, 1928–32*

State	Deaths all causes, per 1,000 population					Maternal mortality, per 1,000 live births				
	1932	1931	1930	1929	1928	1932	1931	1930	1929	1928
Total	10.8	11.0	11.2	11.8	12.0	6.1	6.4	6.3	6.6	7.3
Alabama	10.0	10.4	11.2	12.2	12.0	7.1	7.4	8.1	8.3	8.2
California	10.9	11.3	11.6	11.9	12.5	5.8	6.3	5.3	5.2	5.6
Connecticut	10.0	10.3	10.5	11.3	11.3	5.7	6.8	8.5	5.9	5.8
District of Columbia	16.1	15.9	15.2	15.4	15.1	7.9	6.1	9.1	6.1	8.5
Georgia	10.9	11.1	11.8	11.8	12.4	9.5	10.0	10.6	10.4	10.7
Idaho	9.2	9.6	9.7	9.2	9.4	4.4	2.6	4.4	6.1	6.8
Illinois	10.5	11.1	10.9	11.6	12.1	5.1	8.6	9.1	6.8	5.7
Indiana	11.2	11.3	11.6	12.2	12.2	5.2	5.9	5.8	7.0	6.1
Iowa	10.2	10.3	10.6	10.4	10.4	4.4	4.1	7.0	5.4	5.3
Kansas	10.1	10.0	10.4	10.4	11.2	5.4	5.8	7.0	6.1	7.4
Louisiana	10.6	10.9	11.8	11.8	12.2	8.2	8.9	9.8	10.3	11.1
Maryland	12.6	13.2	13.2	13.5	13.6	4.6	6.0	5.3	5.6	6.5
Michigan	9.7	9.8	10.6	11.8	11.8	5.7	5.9	5.9	6.1	6.6
Minnesota	9.6	9.6	9.7	9.9	10.1	4.1	4.6	4.8	3.9	4.8
Mississippi	9.2	9.9	10.8	11.6	13.1	------	------	------	------	------
Montana	9.7	9.7	9.8	10.7	10.7	5.7	7.0	6.8	8.4	7.5
Nebraska	9.2	9.1	9.4	9.6	10.0	5.0	5.1	5.3	5.4	6.0
New Jersey	10.1	10.6	10.7	11.5	11.5	5.7	5.9	5.7	5.3	5.9
New York	11.3	11.6	11.7	12.4	13.1	6.1	5.9	5.6	5.4	5.8
North Carolina	9.4	10.2	11.4	11.9	11.7	6.8	7.8	7.6	7.5	7.8
Ohio	11.1	11.1	11.4	12.5	12.4	5.9	6.0	5.5	6.6	6.2
Pennsylvania	10.9	11.3	11.3	12.1	12.5	5.4	5.7	5.3	5.9	5.9
South Dakota	8.2	8.6	8.5	8.6	9.0	3.7	4.9	5.6	5.5	4.3
Tennessee	10.5	10.7	11.4	11.7	12.1	6.6	6.8	7.9	7.8	8.9
Virginia	10.9	11.6	11.7	12.0	12.6	6.6	7.4	6.6	6.5	7.5
West Virginia	10.0	10.0	10.4	10.6	10.4	5.1	5.2	5.7	5.3	5.7
Wisconsin	10.0	10.1	10.3	10.7	10.5	4.3	4.3	4.8	5.3	5.9
Hawaii	9.7	9.8	10.4	12.2	11.8	------	------	------	------	------

State	Infant mortality rate per 1,000 live births									
	Total infant mortality					All except malformations and early infancy				
	1932	1931	1930	1929	1928	1932	1931	1930	1929	1928
Total	58	61	62	66	74	26	28	28	32	35
Alabama	61	65	73	74	75	36	40	45	44	48
California	53	57	59	63	62	23	26	29	32	33
Connecticut	51	56	60	68	63	------	------	------	------	------
District of Columbia	73	71	70	69	65	33	35	36	34	25
Georgia	65	69	78	76	82	------	------	------	------	------
Idaho	58	59	51	55	50	32	27	24	25	27
Illinois	52	56	56	61	61	21	25	23	26	29
Indiana	56	59	58	66	64	26	28	26	31	30
Iowa	48	51	56	52	54	20	22	22	21	20
Kansas	47	48	52	57	59	17	19	22	26	20
Louisiana	66	68	80	76	70	36	40	40	48	49
Maryland	70	79	73	80	80	35	45	38	42	38
Michigan	54	56	63	67	69	22	22	27	31	26
Minnesota	43	47	47	48	54	15	17	17	18	21
Montana	49	56	59	64	61	------	------	------	------	------
Nebraska	43	47	49	52	53	15	19	19	23	21
New Jersey	52	57	57	61	65	------	------	------	------	------
New York	53	57	58	61	65	22	33	26	27	31
North Carolina	67	73	77	79	86	------	------	------	------	------
Ohio	60	59	58	66	66	26	26	25	23	29
Pennsylvania	59	65	66	71	71	31	34	30	38	37
South Dakota	51	58	56	56	59	23	28	26	27	28
Tennessee	69	70	71	79	81	42	44	44	53	52
Virginia	66	72	71	74	76	------	------	------	------	------
West Virginia	78	77	81	78	70	40	38	44	41	34
Wisconsin	51	53	56	61	61	19	20	23	27	25
Hawaii	76	75	82	101	------	------	------	------	------	------

Table 3.—*Death rates for various causes per 100,000 population*

State	Typhoid fever (1, 2)					Diarrhea and enteritis under 2 years (119)				
	1932	1931	1930	1929	1928	1932	1931	1930	1929	1928
Total	3.2	3.8	4.0	3.6	4.2	10.3	14.0	17.9	16.5	19.0
Alabama	4.9	6.9	7.9	7.5	9.4	15.4	20.6	31.2	25.3	32.6
California	1.3	1.6	1.7	1.7	2.0	8.2	11.5	14.8	15.3	15.6
Connecticut	.6	1.0	.9	.9	.6	4.1	7.9	10.7	14.0	6.9
District of Columbia	1.4	3.9	3.3	2.7	3.1	16.0	16.7	19.9	18.4	14.6
Georgia	12.6	16.7	16.4	11.6	15.6	13.2	18.8	24.8	17.9	25.4
Idaho	3.3	3.6	4.7	3.2	3.6	2.0	4.7	4.7	8.3	14.5
Illinois	1.7	1.5	1.9	1.4	2.2	6.9	3.9	5.9	12.2	17.2
Indiana	2.5	2.8	3.7	3.5	4.4	11.4	13.1	18.4	16.9	17.7
Iowa	1.7	1.4	1.6	2.3	2.3	3.1	5.9	6.6	3.9	6.1
Kansas	1.7	2.2	3.0	2.9	2.4	7.2	8.1	12.1	10.4	16.9
Louisiana	10.8	14.5	11.7	10.6	12.3	14.0	22.4	22.1	26.3	24.9
Maryland	3.0	5.4	6.4	4.3	5.4	20.3	31.3	30.0	32.5	27.3
Michigan	1.1	1.4	1.8	1.7	1.7	6.3	9.2	14.4	16.0	16.9
Minnesota	.7	.6	1.0	.9	.5	3.9	4.4	6.8	4.1	7.8
Mississippi	6.3	9.5	10.2	8.8	12.5	10.9	14.4	15.0	19.2	17.6
Montana	2.8	2.2	3.2	5.8	3.0	5.0	10.0	15.3	10.6	9.6
Nebraska	1.4	1.7	1.6	1.8	1.8	4.9	7.1	8.3	6.6	9.9
New Jersey	.7	1.0	1.1	1.4	1.7	5.6	9.1	11.5	12.2	14.7
New York	1.0	1.1	1.2	1.3	1.8	6.4	8.7	11.4	11.9	14.5
North Carolina	5.0	5.1	4.4	5.5	6.0	16.8	22.2	29.7	30.1	39.1
Ohio	2.0	2.4	3.3	2.2	2.1	9.2	11.7	16.4	12.5	14.6
Pennsylvania	1.8	2.1	2.6	2.1	2.0	12.3	17.5	22.5	19.7	22.2
South Carolina	14.7	16.6	16.9	14.4	19.5	----	----	----	----	----
South Dakota	1.4	2.7	2.9	3.2	2.9	6.4	11.4	11.0	5.5	9.2
Tennessee	11.0	10.7	12.2	11.9	13.5	20.4	23.4	28.6	23.9	32.0
Virginia	5.1	7.3	5.8	4.4	6.1	14.8	22.5	26.1	19.7	27.7
West Virginia	12.1	12.6	12.1	11.5	10.4	48.9	54.3	70.1	57.8	50.6
Wisconsin	.7	.7	.9	1.4	.8	6.8	10.4	10.2	11.7	11.1
Hawaii	2.4	2.6	2.4	3.9	6.3	45.7	49.3	76.6	103.1	82.8
Industrial policy holders, Metropolitan Life Insurance Co., ages 1 and over [1]	1.7	2.4	2.4	2.4	2.7	4.6	5.9	8.0	7.9	8.7

State	Measles (7)					Whooping cough (9)				
	1932	1931	1930	1929	1928	1932	1931	1930	1929	1928
Total	1.5	2.5	2.9	2.4	4.7	4.2	3.6	4.3	5.8	5.2
Alabama	.2	6.4	3.1	2.4	8.7	7.4	3.6	9.5	9.2	7.7
California	.9	1.9	5.2	.3	.5	2.9	2.4	3.5	5.0	6.4
Connecticut	1.0	2.1	.3	3.0	3.8	2.7	2.5	2.0	2.6	6.4
District of Columbia	.2	2.4	.2	(2)	3.6	4.0	5.7	2.7	5.0	4.6
Georgia	.5	2.1	4.4	1.0	5.2	3.8	3.8	9.0	9.4	5.6
Idaho	.2	1.8	2.0	2.7	.5	.7	6.3	4.3	3.6	3.4
Illinois	.6	4.2	1.0	3.6	1.1	2.9	2.7	2.1	3.4	3.7
Indiana	.4	4.5	1.9	3.7	2.0	5.0	4.3	3.0	5.4	4.3
Iowa	.2	.1	8.1	1.4	.5	2.0	2.4	3.7	4.1	3.2
Kansas	1.3	.4	4.2	2.4	1.0	2.5	1.3	3.5	3.9	5.0
Louisiana	1.7	.6	4.7	2.5	8.6	4.0	5.4	5.9	5.4	8.8
Maryland	1.1	5.9	.4	1.4	6.6	5.4	7.6	4.4	7.9	7.4
Michigan	3.6	.6	4.7	3.1	6.9	3.9	3.7	3.6	5.4	5.0
Minnesota	.5	.3	3.3	3.2	.5	1.7	2.1	2.6	4.5	3.1
Mississippi	.1	.4	1.4	4.3	14.6	4.9	3.4	6.9	9.4	9.2
Montana	2.2	.4	2.2	9.3	1.5	4.1	8.9	3.0	3.3	9.1
Nebraska	.1	.3	6.2	2.4	.7	1.9	4.0	2.6	3.6	3.2
New Jersey	1.0	2.4	3.2	.9	6.4	2.9	3.3	2.2	4.7	4.7
New York	1.6	1.8	1.9	1.5	4.7	2.3	2.9	2.8	3.0	4.9
North Carolina	1.8	3.2	.1	.6	16.6	6.9	5.7	8.5	8.3	6.2
Ohio	2.4	2.1	2.8	3.5	2.9	4.9	2.4	3.0	8.0	3.8
Pennsylvania	2.1	4.2	2.3	3.8	5.2	4.4	3.1	3.9	6.0	5.7
South Carolina	2.4	2.2	.5	.1	16.1	7.6	5.3	10.8	12.7	10.0
South Dakota	(2)	.3	3.0	2.2	1.6	6.3	5.7	2.7	3.8	5.0
Tennessee	.3	3.8	4.9	1.0	7.8	7.5	6.3	6.3	7.4	5.2
Virginia	.9	3.2	3.9	1.6	6.4	12.5	6.2	10.8	10.9	7.7
West Virginia	9.8	2.3	4.9	4.5	3.1	10.2	7.4	12.0	12.8	3.5
Wisconsin	1.4	1.4	3.3	2.7	.5	2.2	1.9	3.3	3.8	2.3
Hawaii	6.6	10.2	4.3	5.0	2.3	1.1	.3	3.5	27.9	4.3
Industrial policyholders, Metropolitan Life Insurance Co., ages 1 and over	1.4	2.6	2.3	2.4	4.2	1.4	1.7	1.9	3.0	2.7

The Metropolitan Life Ins. Co. data for diarrhea and enteritis include adults as well as children under ears.

No deaths.

TABLE 3.—*Death rates for various causes per 100,000 population*—Continued

State	Scarlet fever (8)					Diphtheria (10)				
	1932	1931	1930	1929	1928	1932	1931	1930	1929	1928
Total	2.0	2.1	1.9	2.1	1.9	3.8	4.1	4.6	6.4	7.2
Alabama	1.3	1.1	1.4	1.4	.4	7.5	7.6	7.1	9.6	9.2
California	.9	.9	1.2	1.7	1.0	3.3	2.9	3.4	3.4	6.0
Connecticut	1.2	.7	1.6	.9	1.3	1.0	.8	2.0	3.9	5.6
District of Columbia	2.6	1.0	2.3	2.3	1.5	3.2	7.1	3.7	7.0	9.4
Georgia	.6	1.5	1.3	1.3	1.1	5.7	5.0	4.5	6.0	8.1
Idaho	1.9	2.2	2.0	.9	2.7	3.1	2.5	3.1	2.3	3.6
Illinois	3.3	4.5	3.9	3.9	2.1	3.0	4.7	7.1	9.9	8.7
Indiana	2.6	3.4	2.1	3.2	2.1	5.0	4.1	4.1	4.7	5.7
Iowa	1.5	1.6	2.5	2.2	2.2	2.3	1.7	1.8	1.3	2.7
Kansas	1.7	1.2	2.4	3.3	2.7	3.9	3.7	3.6	3.6	3.3
Louisiana	.4	.7	.6	.6	.5	6.5	6.4	5.0	6.6	7.0
Maryland	1.9	1.9	2.1	2.3	.7	3.1	4.0	3.4	4.5	6.6
Michigan	2.2	2.3	2.7	3.0	4.0	2.1	3.5	6.2	10.5	8.3
Minnesota	1.6	.9	1.4	2.6	2.4	.9	1.4	1.2	2.6	2.8
Mississippi	.6	.5	.6	.3	.8	6.2	9.9	6.8	7.1	8.6
Montana	1.5	1.9	2.8	3.0	1.9	.9	1.7	.7	1.9	3.7
Nebraska	2.0	1.5	2.2	3.8	3.0	4.0	3.5	3.3	3.5	4.0
New Jersey	1.7	2.0	1.5	1.1	1.6	2.3	2.9	8.2	11.2	11.8
New York	2.8	1.7	1.1	1.4	1.6	2.1	2.2	2.7	5.3	7.4
North Carolina	1.1	2.0	1.2	1.7	1.2	4.5	7.3	7.9	11.0	10.0
Ohio	3.3	3.3	2.6	2.2	2.0	3.3	2.8	2.8	3.4	5.7
Pennsylvania	2.6	2.3	1.9	2.5	2.6	4.0	3.6	5.2	7.2	8.9
South Carolina	.5	1.0	.7	.9	.5	4.9	4.9	7.3	8.6	10.1
South Dakota	1.3	.6	.6	2.6	2.8	2.9	2.6	2.9	1.6	2.2
Tennessee	.8	2.4	1.6	2.4	1.6	8.2	9.3	6.6	8.4	8.2
Virginia	1.3	1.4	1.1	1.5	1.1	5.3	8.5	6.1	7.8	7.7
West Virginia	2.4	1.7	1.9	1.5	2.6	13.2	9.3	6.2	7.4	7.8
Wisconsin	1.5	2.1	3.0	2.5	2.5	1.9	1.8	2.4	2.8	3.4
Hawaii	.3	(2)	.3	(2)	1.1	4.8	5.7	11.3	8.9	16.9
Industrial policyholders, Metropolitan Life Insurance Co., ages 1 and over	2.8	3.2	2.5	2.7	2.6	3.8	4.3	5.7	8.6	9.5

State	Poliomyelitis (16)					Meningococcus meningitis (18)				
	1932	1931	1930	1929	1928	1932	1931	1930	1929	1928
Total	0.7	1.9	1.1	0.7	1.1	1.3	1.2	3.1	3.9	2.4
Alabama	.2	.9	.8	1.0	.8	.6	3.6	1.5	1.0	.7
California	.5	.8	2.8	.9	1.5	1.4	2.5	2.8	6.9	2.2
Connecticut	.4	5.9	1.2	.5	.8	.7	.7	.9	1.4	1.1
District of Columbia	1.2	.8	.6	.8	1.0	2.6	5.7	2.0	2.9	1.0
Georgia	.9	1.2	1.1	.7	.7	.8	1.8	3.0	2.3	.7
Idaho	.2	.7	1.3	1.4	2.5	3.1	6.9	6.9	22.3	10.4
Illinois	.5	1.3	.7	.3	.5	2.0	3.2	2.4	3.3	3.0
Indiana	.2	.6	.7	.3	.2	8.9	5.5	8.3	2.7	.2
Iowa	1.0	1.1	1.7	.9	.7	.9	2.6	3.3	1.6	.9
Kansas	.6	.6	3.6	.5	.5	1.3	1.3	2.8	2.8	1.1
Louisiana	.5	.9	2.3	.6	1.0	1.2	2.3	3.6	2.7	.8
Maryland	.4	.7	.4	.2	1.6	1.1	1.8	1.3	1.8	.6
Michigan	.5	2.2	.8	1.0	.7	1.3	2.4	7.5	17.9	4.1
Minnesota	.5	2.4	1.6	.4	2.3	.9	1.6	1.9	1.8	1.8
Mississippi	.8	.4	.5	.6	1.1	1.0	1.5	6.9	.8	1.0
Montana	1.1	2.8	1.1	(2)	1.9	1.3	2.2	4.1	10.0	12.0
Nebraska	.9	.9	3.4	.7	.6	.5	1.0	2.5	2.6	1.8
New Jersey	1.1	3.5	.4	.4	.3	.8	1.8	1.8	2.7	3.8
New York	.4	5.2	1.0	.9	2.0	1.5	2.7	2.6	4.8	5.8
North Carolina	.5	.6	.4	.6	.6	.5	.6	.8	.5	.7
Ohio	.4	.8	1.6	.6	1.1	.8	1.5	1.8	2.7	2.0
Pennsylvania	1.5	1.0	.5	.5	.8	1.3	1.9	2.2	2.8	1.6
South Carolina	.6	.9	.9	.6	1.0	1.4	2.1	4.1	3.0	1.6
South Dakota	1.1	2.3	1.6	1.2	1.3	.4	.3	.3	1.3	1.5
Tennessee	.6	.9	1.0	1.2	1.6	1.4	4.3	9.6	2.2	.9
Virginia	.7	.6	.8	1.3	1.3	1.1	1.8	2.3	1.5	1.3
West Virginia	.7	1.4	.6	.9	2.4	1.1	1.0	1.1	.8	2.0
Wisconsin	.4	1.6	.9	.4	.5	.9	1.3	2.0	3.7	3.3
Hawaii	.8	.8	(2)	1.1	.3	2.9	2.3	4.3	22.1	4.0
Industrial policyholders, Metropolitan Life Insurance Co., ages 1 and over	1.0	2.6	1.1	.6	1.2	------	------	------	------	------

[2] No deaths.

TABLE 3—*Death rates for various causes per 100,000 population*—Continued

State	Influenza (11)					Pneumonia, all forms (107-109)				
	1932	1931	1930	1929	1928	1932	1931	1930	1929	1928
Total	28.0	25.7	19.1	52.8	43.2	77.4	82.0	83.2	92.5	100.2
Alabama	48.4	40.7	35.5	119.8	71.0	66.0	83.4	85.8	87.5	99.2
California	18.3	13.6	9.1	20.0	40.2	64.1	66.5	73.0	78.8	84.6
Connecticut	15.0	17.1	13.4	38.8	22.6	64.4	70.6	87.3	105.4	106.3
District of Columbia	15.5	18.1	8.2	20.5	17.6	135.5	140.3	122.1	143.3	133.3
Georgia	39.0	44.1	32.2	86.3	43.6	82.9	82.9	84.1	77.0	93.6
Idaho	21.0	9.2	11.2	36.7	66.6	76.7	76.5	104.0	61.9	68.4
Illinois	24.0	20.3	11.7	34.5	34.7	67.4	69.1	63.5	81.9	103.1
Indiana	42.1	33.3	19.7	59.2	59.6	84.1	82.3	83.5	98.8	103.9
Iowa	35.8	25.7	26.9	51.5	55.3	78.9	66.8	79.6	63.8	70.2
Kansas	41.6	30.0	29.3	51.3	81.2	53.5	51.5	54.2	58.0	62.5
Louisiana	52.4	42.1	39.9	79.1	62.0	75.5	81.4	91.5	85.9	96.0
Maryland	20.1	20.6	10.3	42.5	19.1	103.0	126.3	118.2	137.6	127.9
Michigan	22.2	16.5	11.9	37.3	35.4	63.3	57.6	68.2	88.8	93.5
Minnesota	30.8	21.8	15.9	39.6	42.6	68.8	69.1	71.1	70.5	74.2
Mississippi	40.5	37.5	29.3	105.6	83.9	48.3	56.3	60.0	62.7	90.1
Montana	41.6	32.7	22.9	42.4	67.8	63.6	70.3	80.2	81.9	84.9
Nebraska	36.9	21.8	17.7	45.9	63.8	62.0	54.3	64.0	60.1	71.4
New Jersey	14.0	13.6	8.9	25.2	15.7	61.3	78.0	77.7	103.5	81.1
New York	12.8	13.4	8.4	27.0	16.7	96.4	105.6	101.9	124.1	133.6
North Carolina	20.5	33.4	24.4	78.2	45.2	80.7	87.1	92.9	90.3	93.5
Ohio	34.1	28.8	19.4	59.6	51.7	76.8	77.9	74.6	91.2	98.9
Pennsylvania	29.3	28.1	19.8	56.1	43.4	81.5	97.2	92.4	106.4	122.0
South Carolina	50.8	65.9	49.7	80.4	76.6	99.0	104.8	102.4	97.0	113.2
South Dakota	28.9	26.0	24.4	51.5	55.3	46.6	55.4	58.1	62.6	68.5
Tennessee	54.1	37.0	31.3	106.1	67.9	87.1	84.5	88.9	91.5	98.3
Virginia	37.3	47.2	29.4	91.9	47.2	71.5	80.6	83.7	76.2	84.1
West Virginia	46.9	33.8	27.8	91.2	59.1	78.3	82.5	91.5	79.5	71.9
Wisconsin	28.5	18.1	30.7	42.3	44.3	66.5	65.4	72.6	74.6	88.1
Hawaii	11.3	11.0	10.5	17.6	24.4	100.1	102.3	118.2	141.1	148.7
Industrial policyholders, Metropolitan Life Insurance Co., ages 1 and over	17.6	19.2	13.2	37.7	22.0	56.8	62.1	62.7	74.0	72.8

State	Tuberculosis, all forms (23-32)					Cancer (45-53)				
	1932	1931	1930	1929	1928	1932	1931	1930	1929	1928
Total	60.4	64.8	68.2	72.8	77.3	100.7	97.6	96.5	95.5	95.8
Alabama	77.2	86.3	86.0	85.7	89.6	55.5	54.3	53.8	51.3	50.3
California	81.0	88.9	98.3	106.3	115.1	120.2	124.2	125.7	118.4	121.3
Connecticut	48.2	52.1	58.8	63.5	69.4	117.8	112.9	114.5	116.0	111.7
District of Columbia	121.5	120.2	116.8	116.6	120.6	146.7	135.2	136.7	131.8	127.2
Georgia	65.5	72.9	73.4	74.0	82.1	52.2	52.7	52.2	48.8	52.3
Idaho	28.6	29.8	32.9	42.5	37.4	76.6	66.4	61.4	78.8	74.3
Illinois	54.1	50.1	59.6	68.8	73.4	114.4	112.7	112.0	107.2	106.4
Indiana	57.3	57.6	63.6	70.2	70.0	105.2	100.6	99.9	99.8	100.5
Iowa	28.2	28.5	33.1	32.6	34.9	116.5	112.9	110.8	107.8	112.0
Kansas	32.5	37.0	36.8	37.8	40.0	104.2	97.0	96.4	92.6	99.1
Louisiana	72.7	81.5	84.1	86.3	87.7	67.1	68.2	68.0	64.4	64.7
Maryland	90.2	95.7	98.9	104.6	105.8	116.1	111.6	111.5	109.8	114.4
Michigan	48.2	53.3	59.8	66.1	67.6	93.3	90.6	90.7	93.3	92.5
Minnesota	39.2	40.0	46.3	54.5	56.0	124.2	121.3	119.1	113.9	114.1
Mississippi	62.6	72.1	78.4	74.2	95.6	50.2	48.7	46.8	44.5	52.3
Montana	55.0	61.3	62.3	65.7	66.2	92.9	74.5	78.9	87.5	83.2
Nebraska	20.3	24.6	24.5	29.9	26.3	100.6	98.5	100.9	94.5	96.5
New Jersey	60.6	65.1	69.3	73.1	72.9	112.9	113.4	107.1	109.3	105.1
New York	62.6	66.4	71.0	74.8	82.7	124.1	123.8	122.7	121.8	126.7
North Carolina	65.5	69.4	74.7	83.3	78.1	46.2	48.2	47.9	51.2	49.6
Ohio	54.9	62.0	63.0	69.8	73.8	110.5	100.8	105.2	104.6	106.1
Pennsylvania	52.5	56.4	59.9	66.1	71.4	102.1	98.9	94.9	103.0	102.4
South Carolina	65.5	70.7	76.5	78.1	85.4	41.6	45.3	39.7	42.5	44.6
South Dakota	45.1	43.7	48.6	53.9	66.0	80.7	82.7	72.9	68.0	71.8
Tennessee	94.7	107.2	115.7	120.3	129.6	56.8	57.1	58.2	58.0	58.3
Virginia	81.0	87.0	85.0	91.4	103.8	67.9	64.3	61.6	62.8	70.0
West Virginia	55.4	59.8	65.4	68.0	73.0	62.0	57.7	59.4	57.9	62.8
Wisconsin	44.9	48.1	50.5	53.3	56.5	116.4	115.8	112.8	110.0	112.2
Hawaii	94.3	98.2	102.3	110.4	124.0	71.5	57.2	59.6	64.5	62.2
Industrial policyholders, Metropolitan Life Insurance Co., ages 1 and over	70.1	76.7	81.3	87.3	90.6	92.1	85.4	79.5	78.8	77.0

TABLE 3.—*Death rates for various causes per 100,000 population*—Continued

State	Diabetes mellitus (59)					Cerebral hemorrhage, apoplexy (82, a, b)				
	1932	1931	1930	1929	1928	1932	1931	1930	1929	1928
Total	21.7	20.3	19.1	18.8	19.4	79 3	78.5	78.9	79.6	81.9
Alabama	10.5	10.8	8.8	9 0	9.7	61.8	61.4	65.5	64.5	63.7
California	20.8	19.2	18 1	19.0	18.9	77.8	78.6	81.9	80 2	86.2
Connecticut	25.1	21.9	17.9	17.5	23.4	------	------	------	------	------
District of Columbia	28.2	25.1	26.6	27.7	27.8	107.5	105.7	99.2	83.8	107.2
Georgia	11.6	10.9	11.6	10.2	11.1	80.0	84 8	90.1	81.8	84.4
Idaho	12.7	12.5	7.8	12.8	11.5	79 9	95.3	71.3	62.2	57.4
Illinois	26 3	25.6	22.1	23.5	23.4	73.0	73.0	74.7	76.0	77.8
Indiana	15.5	16.4	15.7	15.0	21.5	108.7	105.7	108.1	108.4	111.2
Iowa	16.0	19.8	21.0	18.4	19.3	109.0	111.2	95.8	97.1	97.9
Kansas	22.1	21.9	20.9	21.4	20.4	101.2	94.8	99.7	108.9	113.1
Louisiana	13.7	12.8	12.1	11.2	11.8	60.2	57.5	61.8	60.3	64.9
Maryland	25.7	23.0	21.3	19.5	23.2	103.2	108.6	105.1	102.0	102.0
Michigan	21.9	19.1	18.1	19.7	19.0	84.1	87.7	89.9	93.6	97.0
Minnesota	22 2	19.5	18.2	18.6	20.2	77.8	75.4	79.5	75.3	78.3
Mississippi	7.6	7.8	8.9	7.3	10.0	61.9	64.3	66.6	64.9	62.3
Montana	15.8	15.4	16.2	15.2	18.0	70.1	68.0	66.6	59.1	65.6
Nebraska	22.8	21.2	20.6	21.5	22.4	93.0	84.4	84.5	88.4	83.3
New Jersey	26.0	23.9	23.1	23.0	24.5	77.3	79.4	80.4	83.4	88.6
New York	29.9	28.2	26.9	26.2	26.4	51.9	52.0	53.2	57.4	61.1
North Carolina	10.7	10.6	10.0	9.9	9.1	------	------	------	------	------
Ohio	24.2	21.7	21.7	20.7	22.0	110.3	109.1	107.7	112.0	113.9
Pennsylvania	25.7	24.7	21.9	22.3	22.7	85.7	87.0	87.1	88.7	91.9
South Carolina	11.1	10.3	8.9	8.6	9.0	------	------	------	------	------
South Dakota	17.3	20.6	16.9	18.8	18.2	67.0	64.1	61.3	55.0	55.2
Tennessee	10.1	10.6	10.8	10.2	9.4	65.6	60.0	62.9	63.0	66.4
Virginia	15.8	14.9	14.3	11.9	12.3	91.0	97.7	95.8	89.4	92.6
West Virginia	13.0	11.7	12.5	9.7	11.2	76.1	67.9	63.7	49.3	59.1
Wisconsin	22.4	22.4	20.7	19.2	22.3	87.3	85.9	85.6	91.6	90.1
Hawaii	9.5	12.3	13.0	12.6	7.2	51.8	50.7	48.3	53.9	61.9
Industrial policyholders, Metropolitan Life Insurance Co., ages 1 and over	23.3	21.4	18.7	18.6	17.9	62.8	61.3	61.3	------	------

State	Heart diseases (90-95)					Nephritis (130-132)				
	1932	1931	1930	1929	1928	1932	1931	1930	1929	1928
Total	219.5	211.7	209.6	215.1	214.6	84.4	83.7	88.0	90.7	92.9
Alabama	117.9	116.9	134.0	136.2	133.2	84.7	88.2	100.4	95.8	88.6
California	252.2	253.4	239.7	249.0	242.2	80.6	80 9	84.0	89.2	97.4
Connecticut	208.1	203.0	183.6	193.8	179.2	87.8	88.3	73.2	71.1	89.2
District of Columbia	330.6	300.2	315.9	325.5	314.8	140.4	146.2	160.4	162.6	156.7
Georgia	139.9	132.8	138.0	124.5	142.2	109.6	107.4	127.0	134.5	117.8
Idaho	161.2	159.7	174.6	153.1	140.7	43.3	38.7	39.2	61.3	66.4
Illinois	231.6	232.1	223.1	233.9	238.0	108.8	107.2	105.8	109.3	116.8
Indiana	174.0	167.9	182.5	197.4	189.6	69.7	74.3	84.9	80.9	81.8
Iowa	198.3	200.7	195.8	215.4	212.9	45.1	45.9	43.2	49.3	52.3
Kansas	178.0	153.9	171.5	163.7	175.3	100.0	95.3	102.7	90.5	94.4
Louisiana	182.5	178.0	199.1	191.9	183.8	102.5	108.6	112.0	108.2	112.7
Maryland	255.9	251.0	245.2	239.2	237.7	138.4	139.2	149.6	151.0	144.6
Michigan	217.9	204.4	229.6	245.8	218.6	57.8	58.8	63.7	66.1	67.9
Minnesota	193.6	177.9	173.4	155.3	153.8	54.7	50.8	52.2	56.2	57.7
Mississippi	84.2	94.3	104.3	97.2	123.6	68.7	84.7	97.1	95.6	113.0
Montana	158.7	139.6	139.4	169.2	160.1	71.4	66.7	73.1	68.0	61.7
Nebraska	171.4	159.1	159.4	166.0	171.5	72.0	67.9	58.6	68.5	65.2
New Jersey	231.0	234.3	232.1	246.0	258.6	91.0	96.3	102.2	99.5	103.4
New York	294.4	288.0	275.9	293.3	297.9	74.8	73.4	76.4	80.6	82.7
Ohio	237.5	220.3	225.3	227.1	222.7	78.6	74.0	78.4	84.7	88.2
Pennsylvania	238.4	233.5	231.6	236.2	237.8	93.0	92.7	104.3	104.8	111.9
South Carolina	------	------	------	------	------	125.6	121.2	112.6	105.4	113.1
South Dakota	150.3	127.4	123.5	126.5	121.5	41.7	39.1	45.7	53.7	40.2
Tennessee	98.6	108.4	120.3	128.9	124.1	67.2	69.6	75.9	71.6	79.3
Virginia	198.3	188.3	178.2	176.7	198.5	119.5	101.5	108.3	103.0	119.6
West Virginia	113.0	110.6	116.6	112.7	117.1	68.8	64.5	61.3	54.3	77.4
Wisconsin	217.4	203.1	204.8	212.3	200.0	66.5	67.7	67.4	68.0	74.2
Hawaii	100.1	105.7	121.4	118.2	112.9	60.2	68.4	66.9	------	------
Industrial policyholders, Metropolitan Life Insurance Co., ages 1 and over, other (organic) heart only (95)	157.4	150.1	147.1	149.0	144.4	69.4	68.1	69.2	70.6	71.8

DEATHS DURING WEEK ENDED APRIL 15, 1933

[From the Weekly Health Index issued by the Bureau of the Census, Department of Commerce]

	Week ended Apr. 15, 1933	Corresponding week, 1932
Data from 85 large cities of the United States:		
Total deaths	7,907	8,395
Deaths per 1,000 population, annual basis	11.1	12.0
Deaths under 1 year of age	543	671
Deaths under 1 year of age per 1,000 estimated live births [1]	46	56
Deaths per 1,000 population, annual basis, first 15 weeks of year	12.1	12.6
Data from industrial insurance companies:		
Policies in force	68,464,541	73,637,230
Number of death claims	12,859	16,103
Death claims per 1,000 policies in force, annual rate	9.8	11.4
Death claims per 1,000 policies, first 15 weeks of year, annual rate	11.0	10.6

[1] 1933, 81 cities; 1932, 80 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended April 22, 1933, and April 23, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Apr. 22, 1933, and Apr. 23, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Apr. 22, 1933	Week ended Apr. 23, 1932	Week ended Apr. 22, 1933	Week ended Apr. 23, 1932	Week ended Apr. 22, 1933	Week ended Apr. 23, 1932	Week ended Apr. 22, 1933	Week ended Apr 23, 1932
New England States:								
Maine	1		3	2	1	152	0	1
New Hampshire		1	1		4	29	0	0
Vermont		1			58	119	0	0
Massachusetts	25	20	5	4	445	733	0	3
Rhode Island	3	11			1	139	0	0
Connecticut	5	8	10	8	265	160	0	0
Middle Atlantic States:								
New York	65	116	[1] 11	[1] 34	3, 126	2, 271	6	10
New Jersey	24	30	10	22	2, 290	739	0	1
Pennsylvania	63	65			1, 353	2, 265	4	10
East North Central States:								
Ohio	24	32	15	20	768	1, 145	0	2
Indiana	17	33	18	50	205	88	2	9
Illinois	31	73	70	124	726	1, 047	27	6
Michigan	17	19	6	12	986	1, 966	0	4
Wisconsin	4	15	40	101	425	1, 055	1	0
West North Central States:								
Minnesota	2	7		5	1, 051	22	0	1
Iowa	10	10			14	2	2	0
Missouri	21	20	6	13	211	109	4	1
North Dakota	1	5			73	38	0	0
South Dakota	3	3			5	11	1	0
Nebraska	12	4			22	3	5	1
Kansas	14	6	1	1	339	549	0	0
South Atlantic States:								
Delaware	7	4		1	7		1	0
Maryland [2]	6	16	8	51	15	27	1	0
District of Columbia	4	7	2	3	8	12	2	0
Virginia	17				341		2	
West Virginia	10	10	13	131	65	300	0	1
North Carolina	12	11	21	172	525	599	1	0
South Carolina [3]	7	6	273	1, 484	286	150	0	0
Georgia [3]	5	14		142	85	34	0	5
Florida	7	20	2	5	97	3	0	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Apr. 22, 1933, and Apr. 23, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Apr. 22, 1933	Week ended Apr. 23, 1932	Week ended Apr. 22, 1933	Week ended Apr. 23, 1932	Week ended Apr. 22, 1933	Week ended Apr. 23, 1932	Week ended Apr. 22, 1933	Week ended Apr. 23, 1932
East South Central States:								
Kentucky	9	6	25	178	128	82	1	1
Tennessee	11	11	52	342	69	237	0	4
Alabama	13	17	36	140	58	21	1	2
Mississippi	3	8	------	------	------	------	0	0
West South Central States:								
Arkansas	5	4	21	183	305	6	0	4
Louisiana	12	17	2	13	55	86	1	2
Oklahoma [4]	6	25	28	151	195	38	4	0
Texas [3]	48	29	234	300	1,635	383	2	0
Mountain States:								
Montana [5]	------	1	1	5	42	73	0	1
Idaho	------	1	6	------	48	1	0	0
Wyoming [5]	------	------	------	------	9	23	1	0
Colorado	4	10	31	------	8	125	0	0
New Mexico	2	9	1	3	10	77	1	0
Arizona	------	7	------	6	92	1	0	2
Utah [2]	------	1	------	------	7	1	0	0
Pacific States:								
Washington	2	4	------	4	55	342	1	0
Oregon	3	2	31	40	87	293	0	0
California [5]	42	83	19	65	1,229	619	4	3
Total	577	802	1,002	3,815	17,829	16,175	75	74

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Apr. 22, 1933	Week ended Apr. 23, 1932	Week ended Apr. 22, 1933	Week ended Apr. 23, 1932	Week ended Apr. 22, 1933	Week ended Apr. 23, 1932	Week ended Apr. 22, 1933	Week ended Apr. 23, 1932
New England States:								
Maine	0	0	34	41	0	0	3	1
New Hampshire	0	0	49	48	0	0	0	1
Vermont	0	0	12	14	0	4	0	1
Massachusetts	0	0	396	473	0	0	5	2
Rhode Island	0	0	32	63	0	0	0	2
Connecticut	0	0	118	110	2	0	1	0
Middle Atlantic States:								
New York	0	2	703	1,617	0	10	12	11
New Jersey	2	1	331	304	0	0	3	1
Pennsylvania	1	0	840	596	0	0	3	8
East North Central States:								
Ohio	1	0	724	280	3	13	7	11
Indiana	0	0	152	150	2	6	1	2
Illinois	3	1	469	442	12	3	9	2
Michigan	0	0	493	465	0	3	4	5
Wisconsin	0	0	137	63	19	0	3	1
West North Central States:								
Minnesota	0	0	69	155	3	3	0	3
Iowa	0	2	20	62	17	44	0	1
Missouri	0	1	101	68	3	6	0	3
North Dakota	0	0	12	16	0	0	1	0
South Dakota	0	0	16	3	0	4	1	2
Nebraska	0	0	49	20	1	10	0	0
Kansas	0	0	60	65	0	3	2	0
South Atlantic States:								
Delaware	0	0	14	16	0	0	0	0
Maryland [2]	0	0	88	108	0	0	3	8
District of Columbia	0	0	15	26	0	0	0	0
Virginia	0	------	46	------	1	------	6	------
West Virginia	0	0	21	29	1	1	4	3
North Carolina	0	0	47	53	1	3	2	6
South Carolina [3]	1	0	5	4	3	0	5	6
Georgia [3]	1	0	6	16	1	1	6	9
Florida	0	0	9	8	0	0	1	16

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Apr. 22, 1933, and Apr. 23, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Apr. 22, 1933	Week ended Apr. 23, 1932	Week ended Apr. 22, 1933	Week ended Apr. 23, 1932	Week ended Apr. 22, 1933	Week ended Apr. 23, 1932	Week ended Apr. 22, 1933	Week ended Apr. 23, 1932
East South Central States:								
Kentucky	0	0	43	92	0	1	14	0
Tennessee	1	0	47	27	1	16	4	12
Alabama	1	1	8	14	2	25	12	13
Mississippi	0	0	4	8	0	29	3	5
West South Central States:								
Arkansas	0	0	1	4	8	3	3	5
Louisiana	0	3	15	15	1	3	21	14
Oklahoma [4]	0	0	12	31	2	12	0	16
Texas [3]	0	1	69	36	23	87	6	6
Mountain States:								
Montana [5]	0	0	22	13	0	5	1	1
Idaho	0	0	0	4	5	1	1	0
Wyoming [5]	0	0	12	4	0	0	0	1
Colorado	0	0	22	29	3	1	0	1
New Mexico	0	0	10	16	0	1	4	1
Arizona	0	0	3	9	0	0	2	1
Utah [2]	0	0	1	2	0	0	0	1
Pacific States:								
Washington	0	0	47	31	22	14	0	0
Oregon	0	0	30	19	2	16	1	4
California [5]	3	5	165	182	63	16	7	11
Total	14	17	5,579	5,860	201	344	161	197

[1] New York City only.
[2] Week ended Friday.
[3] Typhus fever, week ended Apr. 22, 1933, 12 cases: 1 case in South Carolina, 4 cases in Georgia, and 7 cases in Texas.
[4] Figures for 1933 are exclusive of Oklahoma City and Tulsa and for 1932 are exclusive of Tulsa only.
[5] Rocky mountain spotted fever, week ended Apr. 22, 1933, 5 cases: 2 cases in Montana, 2 cases in Wyoming and 1 case in California.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week:

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
February 1933										
Hawaii Territory	--------	16	113	--------	1	--------	0	3	0	14
New Hampshire	--------	1	15	--------	--------	--------	0	180	0	0
March 1933										
Florida	3	41	71	15	185	10	1	37	0	49
Georgia	7	40	1,417	62	159	24	0	37	30	11
Illinois	97	156	335	1	1,753	2	2	2,322	75	8
Louisiana	9	57	108	15	233	6	0	59	3	49
Maryland	2	33	170	--------	79	--------	1	493	0	22
Michigan	16	103	44	3	5,360	--------	3	2,565	6	15
Minnesota	5	61	13	--------	6,111	--------	0	310	0	4
New Hampshire	--------	--------	10	--------	--------	--------	0	118	0	1
New Jersey	8	96	105	--------	7,350	--------	0	1,540	1	14
Rhode Island	--------	14	25	--------	7	--------	0	190	0	--------
South Carolina	--------	55	3,528	426	713	156	3	26	--------	9
South Dakota	7	26	15	--------	30	--------	2	77	3	14
West Virginia	1	47	119	--------	756	--------	2	127	--------	20

February 1933

	Cases
Hawaii Territory:	
Chicken pox	51
Conjunctivitis, follicular	18
Dysentery, bacillary	2
Hookworm disease	41
Leprosy	5
Mumps	6
Plague	1
Tetanus	2
Trachoma	5
Whooping cough	166

March 1933

	Cases
Anthrax:	
New Jersey	1
Chicken pox:	
Florida	180
Georgia	205
Illinois	2,317
Louisiana	38
Maryland	693
Michigan	2,223
Minnesota	393
New Jersey	1,964
Rhode Island	144
South Carolina	136
South Dakota	140
West Virginia	260
Dengue:	
South Carolina	9
Diarrhea:	
Maryland	1
South Carolina	438
Dysentery:	
Florida	2
Georgia	7
Illinois (amebic)	2
Maryland	3
Minnesota	1
German measles:	
Illinois	68
Maryland	26
Michigan	4,354
New Jersey	110
Rhode Island	1
Hookworm disease:	
Georgia	484
Louisiana	5
South Carolina	104
Impetigo contagiosa:	
Illinois	1
Maryland	26
Lead poisoning:	
Illinois	5
New Jersey	1
Leprosy:	
Louisiana	1
Lethargic encephalitis:	
Georgia	1
Illinois	7
Minnesota	2
New Jersey	3
South Carolina	8
Mumps:	
Florida	11
Georgia	273
Illinois	439
Louisiana	4
Maryland	740
Michigan	1,672
New Jersey	1,721
Rhode Island	60
South Carolina	129
South Dakota	23
West Virginia	19
Ophthalmia neonatorum:	
Illinois	8
Maryland	1
Minnesota	2
New Jersey	3
Rhode Island	1
South Carolina	15
Paratyphoid fever:	
Louisiana	3
Minnesota	1
South Carolina	4
West Virginia	1
Puerperal septicemia:	
Illinois	10
Rabies in animals:	
Illinois	31
Louisiana	4
Maryland	6
New Jersey	20
South Carolina	15
Rabies in man:	
Illinois	2
Louisiana	1
Scabies:	
Maryland	2
Septic sore throat:	
Georgia	23
Illinois	18
Louisiana	1
Maryland	10
Michigan	44
Rhode Island	2
Tetanus:	
Georgia	2
Illinois	1
Louisiana	1
Maryland	2
South Carolina	1
Trachoma:	
Georgia	21
Illinois	1
New Jersey	13
South Dakota	1
Trichinosis:	
Illinois	3
New Jersey	2
Tularæmia:	
Georgia	4
Illinois	4
Louisiana	5
Minnesota	1
South Carolina	2
Typhus fever:[1]	
Florida	3
Georgia	6
Illinois	2
South Carolina	2
Undulant fever:	
Georgia	1
Illinois	8
Louisiana	4
Maryland	4
Michigan	1
Minnesota	3
New Jersey	1
West Virginia	1
Vincent's angina:	
Illinois	127
Maryland	14
Whooping cough:	
Florida	113
Georgia	228
Illinois	341
Louisiana	91
Maryland	133
Michigan	1,331
Minnesota	783
New Jersey	666
Rhode Island	187
South Carolina	282
South Dakota	20
West Virginia	109

[1] The report of 25 cases of typhus fever in Tennessee in March, Public Health Reports, Apr. 21, 1933, p. 431, is erroneous, no cases of typhus fever having occurred.

WEEKLY REPORTS FROM CITIES

City reports for week ended Apr. 15, 1933

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	0	1	0	0	1	2	0	1	1	11	18
New Hampshire:											
Concord	0	-------	0	0	0	0	0	0	0	0	13
Manchester	0	-------	0	0	1	2	0	0	0	0	10
Nashua	0	-------	0	1	0	0	0	0	0	0	-------
Vermont:											
Barre	0	-------	0	0	0	0	0	1	0	15	1
Burlington	0	-------	0	1	0	7	0	0	0	0	3
Massachusetts:											
Boston	12	1	1	204	23	87	0	5	0	53	213
Fall River	0	-------	0	1	0	9	0	0	0	11	30
Springfield	0	1	0	1	2	6	0	2	0	8	39
Worcester	5	-------	0	28	4	24	0	1	0	1	49
Rhode Island:											
Pawtucket	3	-------	0	0	0	1	0	0	0	5	-------
Providence	0	-------	0	0	7	19	0	3	0	11	71
Connecticut:											
Bridgeport	1	-------	0	32	2	15	0	0	0	1	27
Hartford	0	-------	0	15	1	22	0	2	0	4	35
New Haven	0	-------	1	0	2	11	0	2	0	8	45
New York:											
Buffalo	4	-------	0	59	13	60	0	3	0	32	114
New York	35	28	10	2,475	175	395	0	101	4	133	1,599
Rochester	0	-------	0	1	6	28	0	2	0	14	71
Syracuse	0	-------	0	1	5	29	0	2	0	11	55
New Jersey:											
Camden	0	1	0	17	2	12	0	1	0	0	34
Newark	1	3	0	520	15	35	0	3	0	18	70
Trenton	0	-------	0	18	2	13	0	4	0	3	32
Pennsylvania:											
Philadelphia	5	2	2	227	28	111	0	32	0	4	447
Pittsburgh	2	3	1	5	17	66	0	8	0	23	158
Reading	4	-------	0	33	1	16	0	1	0	5	30
Scranton	2	-------	-------	0	-------	20	0	-------	0	2	-------
Ohio:											
Cincinnati	0	1	0	7	7	38	0	8	0	12	118
Cleveland	11	57	1	8	14	190	0	13	0	25	176
Columbus	2	1	1	52	4	26	0	7	1	0	88
Toledo	4	1	1	382	3	116	0	6	0	7	64
Indiana:											
Fort Wayne	3	-------	1	0	0	5	0	0	0	0	28
Indianapolis	2	-------	1	92	13	26	0	4	0	16	-------
South Bend	0	-------	0	9	3	5	0	0	0	1	18
Terre Haute	0	-------	0	0	2	17	0	1	0	1	26
Illinois:											
Chicago	6	2	4	585	65	371	2	41	1	7	680
Cicero	0	-------	0	0	0	4	0	0	0	0	6
Springfield	2	-------	0	0	2	6	0	1	0	0	20
Michigan:											
Detroit	14	1	3	678	15	196	0	20	0	111	261
Flint	0	7	0	246	5	7	0	1	0	5	24
Grand Rapids	0	-------	1	9	3	10	0	0	0	34	31
Wisconsin:											
Kenosha	0	-------	0	1	0	6	0	0	0	1	6
Madison	0	-------	-------	139	-------	2	0	-------	0	2	-------
Milwaukee	1	2	2	3	7	21	0	4	0	43	101
Racine	0	-------	0	2	0	6	0	1	0	16	18
Superior	0	-------	0	0	0	0	0	0	0	7	7
Minnesota:											
Duluth	0	-------	1	12	0	0	0	1	0	31	19
Minneapolis	1	-------	1	46	6	32	0	4	0	10	79
St. Paul	0	1	1	547	4	25	0	2	0	59	65
Iowa:											
Des Moines	5	-------	-------	0	-------	11	0	-------	0	0	27
Sioux City	1	-------	-------	2	-------	2	0	-------	0	2	-------
Waterloo	1	-------	-------	0	-------	3	0	-------	0	0	-------
Missouri:											
Kansas City	1	-------	0	117	7	36	0	4	0	2	87
St. Joseph	2	-------	0	76	0	1	0	0	0	1	-------
St. Louis	12	2	1	16	5	23	0	11	0	0	191

City reports for week ended Apr. 15, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
North Dakota:											
Fargo	0	-------	0	7	2	0	0	1	0	0	12
Grand Forks	0	-------	0	0	0	3	0	0	0	0	-------
South Dakota:											
Aberdeen	0	-------	0	0	0	2	0	0	0	0	-------
Nebraska:											
Omaha	3	-------	0	22	4	2	1	0	0	9	45
Kansas:											
Topeka	0	-------	1	108	2	2	0	0	0	1	19
Wichita	0	-------	1	0	2	3	0	1	1	8	42
Delaware:											
Wilmington	0	-------	0	5	2	6	0	0	0	0	28
Maryland:											
Baltimore	7	3	2	1	34	84	0	10	0	27	210
Cumberland	0	-------	0	0	1	0	0	0	0	0	6
Frederick	0	-------	0	0	0	1	0	1	0	0	4
District of Col.:											
Washington	4	3	3	8	7	15	0	16	0	2	148
Virginia:											
Lynchburg	0	-------	0	1	1	1	0	0	0	2	11
Norfolk	0	-------	1	0	0	7	0	2	0	6	21
Richmond	0	-------	2	8	3	10	0	1	0	7	40
Roanoke	0	-------	0	64	0	0	0	0	0	0	6
West Virginia:											
Charleston	0	-------	0	1	1	3	0	0	0	1	15
Huntington	0	-------	-------	3	-------	3	1	-------	0	1	-------
Wheeling	0	-------	0	9	0	2	0	0	0	0	12
North Carolina:											
Raleigh	0	-------	0	0	0	5	0	0	0	0	10
Wilmington	0	-------	0	185	2	0	0	3	0	2	19
Winston-Salem	0	1	0	13	0	6	0	1	0	9	5
South Carolina:											
Charleston	7	12	1	0	2	1	0	2	1	12	24
Columbia	0	-------	3	0	5	0	0	0	0	0	17
Greenville	0	-------	0	21	1	0	0	0	0	0	9
Georgia:											
Atlanta	1	36	3	34	10	2	0	2	1	7	76
Brunswick	0	1	1	0	1	0	0	0	0	0	4
Savannah	0	11	2	1	3	0	0	1	0	2	31
Florida:											
Miami	0	5	0	2	2	0	0	3	0	4	28
Tampa	2	-------	0	1	1	0	0	0	1	4	20
Kentucky:											
Ashland	0	-------	0	40	0	2	0	0	0	6	-------
Lexington	0	-------	0	5	2	2	0	2	0	4	11
Louisville	1	-------	1	5	10	16	0	1	0	0	76
Tennessee:											
Memphis	1	-------	1	18	8	3	0	1	1	8	67
Nashville	0	-------	2	0	2	1	0	3	0	2	48
Alabama:											
Birmingham	0	3	0	2	7	1	0	5	1	1	54
Mobile	0	-------	0	11	3	0	0	1	0	1	17
Montgomery	0	1	-------	5	-------		0	-------	0	0	-------
Arkansas:											
Fort Smith	2	-------	-------	0	-------	0	0	-------	0	1	-------
Little Rock	0	-------	0	84	3	1	1	1	0	0	4
Louisiana:											
New Orleans	6	3	4	16	12	2	0	12	0	12	129
Shreveport	0	-------	0	2	3	1	0	0	0	0	25
Oklahoma:											
Tulsa	0	-------	-------	58	-------	0	6	-------	0	5	-------
Texas:											
Dallas	6	4	4	-------	0	12	0	2	0	0	50
Fort Worth	0	-------	-------	27	-------	1	0	-------	0	0	-------
Galveston	0	-------	0	0	1	0	0	1	0	0	10
Houston	4	-------	0	8	13	1	0	6	0	0	65
San Antonio	1	-------	3	18	6	1	0	9	1	0	73
Montana:											
Billings	0	-------	0	0	0	0	0	0	0	0	4
Great Falls	0	-------	0	0	0	1	0	0	0	3	5
Helena	0	-------	0	2	0	1	0	0	0	0	2
Missoula	0	-------	0	0	0	0	0	0	0	0	4

City reports for week ended Apr. 15, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Small pox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Idaho:											
Boise	0	-------	0	15	0	1	2	0	0	0	1
Colorado:											
Denver	1	37	1	0	7	12	0	2	2	1	64
Pueblo	0	-------	0	0	0	1	0	1	0	4	12
New Mexico:											
Albuquerque	0	-------	0	0	3	0	0	2	0	19	15
Utah:											
Salt Lake City	0	-------	1	1	2	2	0	0	1	14	34
Nevada:											
Reno	0	-------	0	0	0	0	0	0	0	0	9
Washington:											
Seattle	0	-------	-------	11	-------	8	0	-------	0	4	-------
Spokane	0	-------	-------	1	-------	1	2	-------	0	0	-------
Tacoma	0	-------	0	0	2	2	1	1	0	1	26
Oregon:											
Portland	0	2	1	3	0	10	4	0	1	5	61
Salem	0	2	-------	14	-------	1	0	-------	0	0	-------
California:											
Los Angeles	23	7	1	513	7	40	18	26	0	63	273
Sacramento	0	-------	0	4	2	0	0	1	3	44	28
San Francisco	0	31	0	2	11	11	0	11	0	69	158

State and city	Meningococcus meningitis		Poliomyelitis cases	State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
New York:				District of Columbia:			
Buffalo	1	0	0	Washington	2	0	0
New York	3	0	1	South Carolina:			
Pennsylvania:				Greenville	0	1	0
Pittsburgh	3	1	0	Georgia:			
				Atlanta	1	0	0
Indiana:				Savannah	0	0	1
Indianapolis	0	0	1				
Illinois:				Arkansas:			
Chicago	11	10	1	Fort Smith	1	0	0
Michigan:				Louisiana:			
Detroit	0	1	0	New Orleans	1	1	0
Grand Rapids	0	1	0	Texas:			
				Dallas	1	1	0
Minnesota:				Houston	0	1	0
Duluth	0	1	0				
Iowa:				Utah:			
Des Moines	1	0	0	Salt Lake City	1	0	0
Sioux City	1	0	0				
Missouri:				Washington:			
St. Louis	1	1	0	Seattle	0	0	1
Nebraska:				California:			
Omaha	4	0	0	Los Angeles	0	1	1
				San Francisco	1	1	0
Maryland:							
Baltimore	1	1	0				

Lethargic encephalitis.—Cases: New York, 2; Pittsburgh, 1; Chicago, 2; Memphis, 1.
Pellagra.—Cases: Wheeling, 1; Miami, 1; Birmingham, 4; Los Angeles, 3.
Typhus fever.—Cases: Tampa, 1.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—2 weeks ended April 8, 1933.—The Department of Pensions and National Health of Canada reports cases of certain communicable diseases for the 2 weeks ended April 8, 1933, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba [1]	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		2		1	5				2	10
Chicken pox				465	510	30	48	5	122	1,180
Diphtheria		7	1	45	29	4	15		3	104
Erysipelas				28	7		3	2	3	43
Influenza		31		6	11				3	51
Measles	20	41	8	324	439	7		14	7	860
Mumps		3			530	45	18		57	653
Paratyphoid fever					2					2
Pneumonia		4			8		14		5	31
Poliomyelitis				1						1
Scarlet fever		18	7	93	140	14	30	9	6	317
Smallpox					3		2		6	11
Trachoma									2	2
Tuberculosis	1	2	25	156	102	8	16	10	63	383
Typhoid fever			1	29	13	1			4	48
Undulant fever					6		1			7
Whooping cough				183	176	44	34	8	34	479

[1] Report from Manitoba for week ended Apr. 8 not included.

Ontario Province—Communicable diseases—4 weeks ended March 25, 1933.—The Department of Health of the Province of Ontario, Canada, reports certain communicable diseases for the 4 weeks ended March 25, 1933, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	1	1	Poliomyelitis	1	
Chicken pox	1,226	2	Puerperal septicemia		1
Diphtheria	47	2	Scarlet fever	299	4
Dysentery	1		Septic sore throat	6	1
Erysipelas	14	1	Smallpox	5	
German measles	9		Syphilis	290	1
Gonorrhea	222		Trachoma	2	
Influenza	115	17	Tuberculosis	179	46
Measles	1,106	3	Typhoid fever	20	1
Mumps	1,006		Undulant fever	15	
Paratyphoid fever	9		Whooping cough	513	
Pneumonia		125			

CUBA

Provinces—Communicable diseases—4 weeks ended March 4, 1933.—During the 4 weeks ended March 4, 1933, cases of certain communicable diseases were reported in the provinces of Cuba as follows:

Disease	Pinar del Rio	Habana	Matanzas	Santa Clara	Camaguey	Oriente	Total
Chicken pox	2	5		1	1		9
Diphtheria		10		4			14
Hookworm disease				1			1
Malaria		8	88	186	90	72	444
Measles	2	2	3	25	1	2	35
Tuberculosis	8	11	2	10	8	12	51
Typhoid fever	1	15	2	24	13	12	67

ITALY

Communicable diseases—4 weeks ended October 16, 1932.—During the 4 weeks ended October 16, 1932, cases of certain communicable diseases were reported in Italy as follows:

Disease	Sept 19–25		Sept. 26–Oct. 2		Oct 3–9		Oct. 10–16	
	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected
Anthrax	39	33	49	43	53	45	29	28
Cerebrospinal meningitis	2	2	4	4	6	6	5	5
Chicken pox	32	26	40	30	34	27	55	35
Diptheria and croup	430	234	540	291	539	267	754	338
Dysentery	29	19	68	29	73	34	51	31
Lethargic encephalitis	1	1	2	2	2	2	1	1
Measles	334	119	427	138	304	102	558	133
Poliomyelitis	31	27	40	33	19	17	27	21
Scarlet fever	413	167	537	180	486	176	573	215
Smallpox					2	1		
Typhoid fever	1,932	747	2,327	877	1,655	706	2,073	785

YUGOSLAVIA

Communicable diseases—March 1933.—During the month of March 1933 certain communicable diseases were reported in Yugoslavia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	38	9	Poliomyelitis	8	3
Cerebrospinal meningitis	12	4	Scarlet fever	222	17
Diphtheria	624	105	Sepsis	10	4
Dysentery	35	7	Tetanus	25	13
Erysipelas	125	10	Typhoid fever	245	28
Measles	912	16	Typhus fever	122	9
Paratyphoid fever	8	2			

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

(NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for Apr. 28, 1933, pp. 459–470. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued May 26, 1933, and thereafter, at least for the time being, in the issue published on the last Friday of each month.)

Cholera

Philippine Islands.—During the week ended April 22, 1933, 3 cases of cholera with 4 deaths were reported at Ormoc, Leyte Province, Philippine Islands.

Plague

Bolivia.—During the last 2 weeks of February 1933 an outbreak of plague appeared in several parts of the Province of Tomina, Department of Chuquisaca. The number of cases is unknown. The mortality is said to be as high as 80 percent. A sanitary cordon had been established and all prophylactic measures were being taken.

Peru.—During the month of March 1933, 7 cases of plague, with 7 deaths, were reported in Peru. The cases occurred in the Departments of Lambayeque, Libertad, and Lima.

Smallpox

Bolivia.—During the month of February 1933, 39 cases of smallpox were reported in La Paz, Bolivia.

Typhus Fever

Bolivia.—During the month of February 1933 typhus fever was reported in Bolivia as follows: La Paz, 33 cases; Ulla-Ulla and Guaqui, several cases; Potosi, 8 cases; and Santa Cruz, some isolated cases.

Chile.—From January 1 to February 4, 1933, 365 cases (15 suspected cases) of typhus fever were reported in Chile. Two cases were reported in Antofagasta, 9 in Concepcion, 1 in Santiago, and 4 in Talcahuano.

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UNITED STATES PUBLIC HEALTH SERVICE

HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst. Surg. Gen. R. C. WILLIAMS, *Chief of Division*

The PUBLIC HEALTH REPORTS are issued weekly by the United States Public Health Service through its Division of Sanitary Reports and Statistics, pursuant to acts of Congress approved February 15, 1893, and August 14, 1912.

They contain: (1) Current information of the prevalence and geographic distribution of preventable diseases in the United States insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other communicable diseases throughout the world. (2) Articles relating to the cause, prevention, or control of disease. (3) Other pertinent information regarding sanitation and the conservation of the public health.

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PUBLIC HEALTH REPORTS

VOL. 48 MAY 12, 1933 NO. 19

CURRENT PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES[1]

March 26–April 22, 1933

The prevalence of certain important communicable diseases, as indicated by weekly telegraphic reports from State health departments to the United States Public Health Service, is summarized in this report. The underlying statistical data are published weekly in the Public Health Reports, under the section entitled "Prevalence of Disease."

Measles —The number of cases of measles increased from approximately 62,000 for the preceding 4-week period to 72,000 for the 4 weeks ended April 22. An increase over the preceding period was reported from all sections of the country except the West North Central. The total reported incidence was about 17 percent in excess of the incidence for the corresponding period last year. For this period in the years 1931 and 1930 the number of cases was 80,804 and 68,364, respectively. A comparison of geographic areas shows an excess during the current period over the same period last year in all except the East North Central and Mountain areas, in each of which a decrease of more than 50 percent was noted in the number of cases.

Scarlet fever —For the reporting States as a whole, the incidence of scarlet fever (26,299 cases) was the highest for this period in the 5 years for which data are available. One area, however, the East North Central, seemed mostly responsible for the increase over last year. The five States in that group reported 10,017 cases for the current period as compared with 6,070 for the corresponding period last year. In other areas, the incidence closely approximated that of last year and came close to the average for the preceding 5 years.

Typhoid fever —The number of cases of typhoid fever reported for the current 4-week period was 609, as compared with 664, 513, and 663 for the years 1932, 1931, and 1930, respectively. The incidence was low in relation to last year in all regions except the West South Central and Mountain areas. While the numbers of cases were not high in those regions, they represented a slight increase over the corresponding period last year.

[1] From the Office of Statistical Investigations, U S Public Health Service The numbers of States included for the various diseases are as follows Typhoid fever, 48, poliomyelitis, 48, meningococcus meningitis, 48, smallpox, 48, measles, 48, diphtheria, 48, scarlet fever, 48, influenza, 38 States and New York City The District of Columbia is counted as a State in these reports

Poliomyelitis.—The incidence of poliomyelitis continued to be the lowest in the 5 years for which data are available. For the current 4-week period 54 cases were reported. The States in the East North Central area reported 17 cases, which was the highest number reported from any area That number was the same as was reported from that group of States last year, while all other areas reported decreases from last year's figure.

Smallpox.—The reported incidence of smallpox (815 cases) was 53 percent of last year's figure for the same period. For this 4-week period in 1931 and 1930 the number of cases totaled 4,068 and 6,360, respectively. Appreciable decreases were reported from all except the South Atlantic and Mountain areas. In the South Atlantic States the number of cases (17) was the same as last year, while in the Mountain area 44 cases were reported for the current period as against 21 last year.

Meningococcus meningitis.—The recorded incidence of meningococcus meningitis (340 cases) was approximately the same as that for the corresponding period last year. It was, however, only about 50 percent of the number for the same period in 1931 and 25 percent of that in 1930. For the current period the New England, Middle Atlantic, South Atlantic, and East North Central areas reported decreases from last year. The West North Central and West South Central reported slight increases, and in the East North Central, Mountain, and Pacific regions the incidence was practically the same as that of last year.

Diphtheria.—The steady decline in the reported incidence of diphtheria continued. For the country as a whole, 2,523 cases were reported for the current 4-week period, or about 78 percent of last year's figure for the corresponding period. All regions were low in relation to last year except the South Atlantic and West South Central. In those regions the numbers of cases were not high, but they represented slight increases as compared with last year.

Influenza.—The incidence of influenza dropped about 50 percent from the preceding 4-week period, and the number of cases reported (5,317) was approximately 1,300 below the number reported for the corresponding period in 1930, a very normal year, and slightly below the incidence in 1929 when the 1928–29 epidemic had apparently died out. In 1932 and 1931, when minor epidemics were present, the number of cases for this period totaled 21,742 and 12,011, respectively. A comparison of geographic areas shows that the situation in all areas was similar to that described for the country as a whole.

Mortality, all causes.—The average mortality rate from all causes in large cities, as reported by the Bureau of the Census, for the current 4-week period was 11.3 per thousand population (annual basis), as compared with 12.5, 12.9, and 13.3 for the years 1932, 1931, and

1930, respectively. The rate is, in fact, the lowest for this period in the years for which comparable data are available.

PROTECTIVE VALUE OF CONVALESCENT SERA OF SAO PAULO EXANTHEMATIC TYPHUS AGAINST VIRUS OF ROCKY MOUNTAIN SPOTTED FEVER [1]

By R. R. Parker, *Special Expert*, and Gordon E. Davis, *Bacteriologist, United States Public Health Service*

Protection tests recently made against Rocky Mountain spotted fever virus with sera of guinea pigs and rabbits recovering or recovered of exanthematic typhus of Sao Paulo showed a degree of protection sufficient to suggest a close relationship between these two viruses.

Upon request convalescent sera of the Sao Paulo disease were kindly sent to us by Dr. J. L. Monteiro of the Instituto Butantan, in October 1932. The sera used, six in number, were of blood samples, taken post febrile, at the times shown in the following table:

Serum No	Taken days post-febrile	Animal source
30	17	Rabbit
851	15	Guinea pig
806	2	Do
818	2	Do
849	1	Do
816	1	Do

TECHNIQUE OF PROTECTION TESTS

The procedure followed in testing the Sao Paulo sera was the same as that usually employed when making tests to secure evidence concerning the specificity of sera of persons or animals suspected to have recovered from Rocky Mountain spotted fever.

For each convalescent serum a series of three serum-virus mixtures was prepared, each mixture containing 0.5 cc of the test serum and 0.1 cc, 0.25 cc, and 0.5 cc, respectively, of spotted fever serum-virus of a strain of known high virulence. After standing one half hour at room temperature, these mixtures were injected intraperitoneally into separate guinea pigs. Whenever sufficient convalescent serum was available, the series was duplicated in whole or in part.

Spotted fever serum-virus is used in such tests for the reason that whole blood virus of the highly fatal strains maintained at the Hamilton (Mont.) laboratory is frequently so virulent that it may

[1] Contribution from the Rocky Mountain Spotted Fever Laboratory of the United States Public Health Service, Hamilton, Mont.

even obscure the protective properties of known specific convalescent sera.

Two of the Sao Paulo sera were tested in complete duplicate series; of two others, the mixtures containing 0.1 cc and 0.25 cc of virus were duplicated, while of the remaining two, but one series of each was possible.

The spotted fever serum-virus was of lot no. 265, which was pooled guinea pig blood virus of a highly virulent strain isolated in 1932 from a fatal western Montana case (blood strain).

Spotted fever serum-virus control guinea pigs were injected intraperitoneally as follows: Four received 0.1 cc each; four, 0.25 cc; and four 0.5 cc.

In another control group duplicate series of three guinea pigs each were injected with mixtures identical with those above, that contained guinea pig convalescent spotted fever serum (taken on the seventh day after defervescence) and serum-virus no. 265. The purpose of these series was to test the protective value of a known specific serum against the virus used.

The above animals were observed over a period of 20 days. Male guinea pigs were used, with one exception.

In interpreting the results of the test, only temperatures above 39.6° C. were considered as indicating fever. Most of the surviving guinea pigs were killed and necropsy done on the twentieth day. The expression "typical" as hereafter used in reference to spotted fever, means that there was both fever and a characteristic gross scrotal involvement with or without sloughing.

RESULTS

The procotols of the protection tests are shown graphically in chart 1.

Serum 30.—The 3 guinea pigs injected with the mixtures of Sao Paulo convalescent serum no. 30 and spotted fever serum-virus all remained afebrile and were normal grossly when killed and subjected to necropsy.

Serum 851.—The 3 guinea pigs that received the convalescent serum no. 851-serum-virus mixtures all remained afebrile except that the one receiving the mixture containing 0.5 cc of virus had fever of 40.0° C. on the tenth day. There was no evidence of spotted fever at any time and all were apparently well when killed and their tissues appeared normal.

Serum 849.—Of the 6 guinea pigs used in the complete duplicate tests of convalescent serum no. 849, both animals that received 0.1 cc of virus, and 1 of each pair that received 0.25 cc and 0.5 cc, respectively, remained without fever. One of those that received 0.25 cc of virus had fever of 38.8° C. on the sixth day and 40.0° C. on the seventh day, while 1 of the animals given 0.5 cc had fever of 39.8° C. on the fourth day and 40.0° C. on the sixth; neither showed scrotal swelling nor other evidence specifically suggestive of spotted fever. When killed and examined macroscopically all were well and their tissues were found normal.

Serum 818.—Two guinea pigs received duplicate mixtures containing 0.1 cc of serum-virus and 2 others mixtures that contained 0 5 cc; only 1 received 0.25 cc. Each of the 2 that received 0 1 cc each had 1 and 2 days of fever, respectively, one 40.0° C. on the seventeenth day and the other 39.8° C. on the third day and 40 0° C. on the ninth. The animal receiving 0.25 cc had 5 days' intermittent fever of 39.8° C. to 40 4° C. between the third and ninth days. One

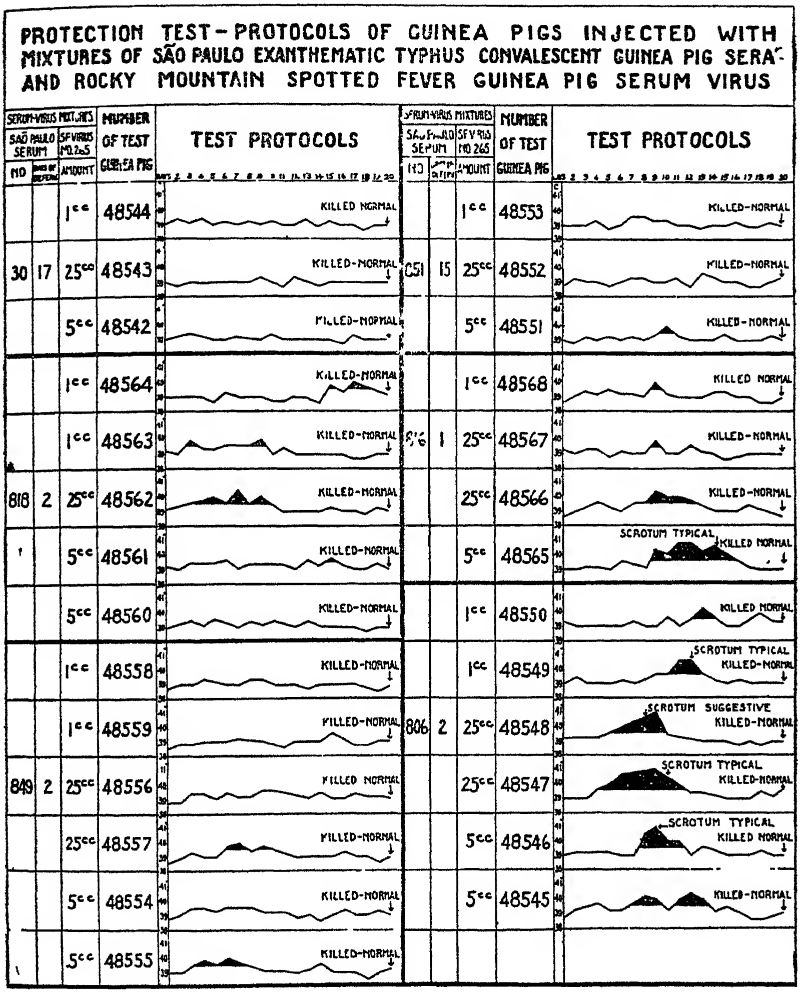

CHART 1

of the animals given 0.5 cc remained afebrile, the other showed 39.8° C. on the fifteenth day. None of these guinea pigs appeared ill; none at any time showed any external evidence suggestive of spotted fever and all seemed well when killed and the tissues appeared normal at necropsy.

Serum 816.—Two guinea pigs received mixtures containing 0.25 cc of virus and 1 each received mixtures having 0.1 cc and 0.5 cc of virus, respectively. The 1 guinea pig that received 0 1 cc of virus and 1 of the 2 that received 0.25 cc were afebrile except that each had 40.0° C. on the ninth day. The other animal

which received 0.25 cc of virus had fever ranging from 39.8° C. to 40.4° C. for a 4-day period from the ninth to the twelfth day, inclusive. The animal injected with 0.5 cc of virus had fever from 40.0° C. to 40.8° C. from the ninth to the fourteenth day, and on the latter day the scrotum became swollen and otherwise typical of spotted fever. None of these guinea pigs, except the last, had any lesions indicative of spotted fever, and all, including the last, were apparently well when sacrificed, and their tissues were normal grossly.

Serum 806.—All of the 6 animals used to test this serum had fever; 3 showed fever only and the other 3 showed, in addition, the typical scrotal lesions of spotted fever. Of the 2 guinea pigs injected with 0 1 cc of virus, 1 was afebrile except for 40.2° C. on the thirteenth day and 39.8° C. on the seventeenth; the other had 2 consecutive days of fever, the eleventh and twelfth, both 40.6° C., and showed typical lesions on the latter day Of the guinea pigs that received 0.25 cc of virus,

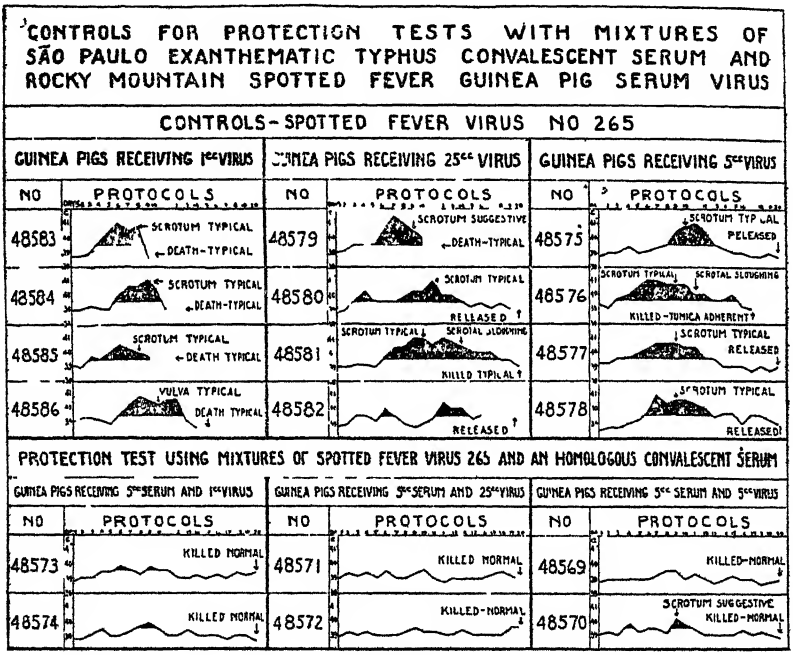

CHART 2

1 had fever of 39.8° C. to 41.0° C. from the sixth to the tenth day, and the scrotum was suggestive; the second had fever ranging from 40.0° C. to 41 0° C. from the fifth to the eleventh day and showed a typical spotted fever scrotum on the tenth day. Of the animals injected with 0.5 cc of virus, 1 was febrile the eighth to the eleventh day, 40.0° C. to 41.0° C., and showed typical lesions on the ninth; the other had fever from the eighth to the thirteenth day, except for 39.6° C. on the tenth, but showed no other evidence of illness. When killed and necropsied, the internal organs of all 6 guinea pigs appeared normal macroscopically.

Serum-virus controls.—Of the 12 virus control guinea pigs, the 4 injected with 0.1 cc of serum virus all died of typical spotted fever on the tenth, thirteenth, thirteenth, and fifteenth days, respectively. Of the 4 that received 0.25 cc of virus, 1 died typically on the twelfth day, 2 ran typical spotted fever courses and recovered (1 of them showing scrotal sloughing), while the fourth ran an atypical intermittent fever, suggestive of an intercurrent infection. The 4 animals given

0.5 cc of virus all had typical spotted fever infections and recovered. Three showed scrotal sloughing, and one showed sloughing of the feet also. Two of 3 surviving animals receiving 0.25 cc and 1 of the 4 given 0.5 cc were killed and examined at necropsy on the twentieth day. Of the former 2, the one which had a febrile course suggestive of intercurrent infection showed a definite pneumonia only; in the other, the visceral and parietal laminae of the tunica vaginalis were completely and typically adherent. This was also true of the one animal which received 0.5 cc. One given 0.25 cc and 3 given 0.5 cc were each injected on the eighteenth day with 1.0 cc of guinea pig citrated whole blood virus no. 270 and all 3 were wholly immune.

The protocols of the spotted fever virus controls are presented graphically in chart 2.

Protection test using mixtures of serum-virus 265 and homologous convalescent sera.—Of the 6 guinea pigs used for this test of 7-day convalescent spotted fever guinea pig serum mixtures containing graded amounts of serum-virus no. 265, 3 remained afebrile—one that received 0.5 cc and both that received 0 25 cc of virus. One of the guinea pigs that received 0.1 cc showed 39.8° C. temperature on the sixth and ninth days, the other on the ninth day only. The second animal receiving 0.5 cc of virus had but two days of fever, 39.8° C. on the fourth and 40.2° C. on the ninth; but on the latter day the scrotum showed a suspicious swelling, presumably due to spotted fever, but not of sufficient degree to be definitely diagnostic All 6 animals appeared normal in every way when sacrificed. The protocols of this test are shown in chart 2.

DISCUSSION

It is believed that the results of the above protection tests using convalescent Sao Paulo exanthematic typhus sera against Rocky Mountain spotted fever serum-virus suggest a close relationship between these viruses. Similar tests which we have made with sera of guinea pigs or rabbits recovered of tsutsugamushi and of South African tick bite fever have shown no degree of protective value. The latter sera were received through the courtesy of Dr. A. Pijper of Pretoria, South Africa, the former through that of Dr. N. Ogata of the Chiba University of Medicine, at Chiba, and Dr. R. Kawamura of the Niigata Medical College, Niigata, Japan.

Three of the Sao Paulo sera, nos. 30, 851, and 849, showed complete, or essentially complete protective value. The test of serum no. 818 was nearly as good, full protection being indicated in the duplicate tests against the 0.1 and 0.5 cc amounts of spotted fever virus; while the single guinea pig that received 0.25 cc of virus ran an intermittent fever that was possibly occasioned by a weakened spotted fever infection. In the test of serum no. 816, the guinea pigs that received mixtures containing 0.1 and 0.25 cc of spotted fever virus were essentially fully protected; the one that received 0.5 cc showed, at most, not more than slight protection. The fact that all these guinea pigs had their initial fever (two had but one day of fever) on the same day, suggests that even the 1-day fevers were reaction due to the spotted fever virus. In the test of serum no. 806, protection, though less

marked, is nevertheless evident. Neither of the guinea pigs that received 0.1 cc of spotted fever virus died, as compared with the death of all four controls receiving 0.1 cc of spotted fever virus; also, this serum patently offered better protection against 0.1 cc of spotted fever virus than against the larger amounts. Moreover, none of the other four guinea pigs died, none showed scrotal or pedal sloughing, only two showed typical scrota, and the average febrile period, as compared with their controls, was definitely shorter.

The 3 Sao Paulo sera that afforded the best protection were taken 17 (rabbit), 15, and 2 days, respectively, after the termination of fever. The less effective sera were taken 2 days, 1 day, and 1 day, respectively.

The test of immune guinea pig spotted fever serum against spotted fever serum-virus no. 265 and the complete immunity of three of the recovered spotted fever serum-virus controls when injected with spotted fever virus no. 270, are sufficient evidence of the specificity of virus no. 265. The homologous serum afforded no better protection than that afforded by Sao Paulo sera nos. 30, 851, and 859.

The death of all four spotted fever virus control guinea pigs that received the smallest amount of serum-virus, viz, 0.1 cc, while only one of the eight animals receiving the larger amounts of virus died, is a phenomenon quite frequently encountered when using graded doses of spotted fever virus.

The protection test herein employed, all conditions considered, is an extremely useful test in the laboratory diagnosis of Rocky Mountain spotted fever. However, even when using known specific convalescent sera, the results are occasionally as indefinite as in the case of Sao Paulo serum no. 806. The results of the test of this individual serum would have been of less significance in an isolated test than as one of a group such as is herein concerned.

While these results suggest a close relationship of the two viruses that are being compared, they are not sufficient to establish identity. Similar protection tests in the other direction and reciprocal cross-immunity tests should give further information of value on the relationship. In this connection, Felix (1933) has called attention to the group agglutinins for *proteus* X strains produced in certain diseases of the typhus group and has suggested that cross-immunity tests between two viruses which contain a major antigenic component in common, but one of which contains a minor component lacking in the other, may fail to establish complete or even partial cross-immunity. It is, therefore, of interest that while sera from at least some human cases of exanthematic typhus of Sao Paulo contain minor agglutinins for OXK strains, these agglutinins, in a significant titer, have not been constantly encountered in sera of Rocky Mountain spotted fever. It may be, therefore, that although Sao Paulo immune

sera have protective properties against the virus of spotted fever, spotted fever sera, on the other hand, may not fully protect against the virus of the Sao Paulo disease. The results of such tests should be of considerable interest.

Along with the other data given in this paper, it is worth noting that Monteiro and his associates (1932) have suggested *Amblyomma cajennense* as a likely transmitting agent of Sao Paulo typhus. Experimentally, they have shown the survival of the virus in adult ticks of this species and its "hereditary" transmission from an infected female to its progeny. Piza (1932) also considers ticks as the probable vectors. In the course of our studies of various species of ticks as possible transmitting agents of spotted fever, we have shown that *A. cajennense* that fed as larvae on spotted fever-infected guinea pigs were able to transmit infection in the resultant nymphal and adult stages.

SUMMARY

The sera of six laboratory animals recovered of Sao Paulo exanthematic typhus have been tested for protective value against the virus of Rocky Mountain spotted fever. Three of these sera afforded complete or essentially complete protection, the fourth a degree of protection nearly as good, while the other two showed definite but less marked protective properties. These results suggest a close relationship between the two viruses.

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ROCKY MOUNTAIN SPOTTED FEVER AND BOUTONNEUSE FEVER

A Study of Their Immunological Relationship

By L. F. BADGER, *Passed Assistant Surgeon, United States Public Health Service*

Boutonneuse fever of the Mediterranean littoral, first described by Conor and Bruch,[1] is an acute, noncontagious, febrile disease transmitted by the tick *Rhipicephalus sanguineus* and characterized

[1] Conor, A., and Bruch, A. Bull de la Soc Path., 1910, 23 492

clinically by fever, headaches, muscular and joint pains, and an exanthem.

The similarity between boutonneuse fever and Rocky Mountain spotted fever has frequently been noted, and Brumpt [2] has recently reported the results of his study on the immunological relationship between the viruses of these two diseases. Brumpt, in his study, compared a virus of Rocky Mountain spotted fever, western type, obtained from the United States Public Health Service, with a virus of boutonneuse fever isolated at Marseille. From his study he concluded that the two diseases are distinct entities.

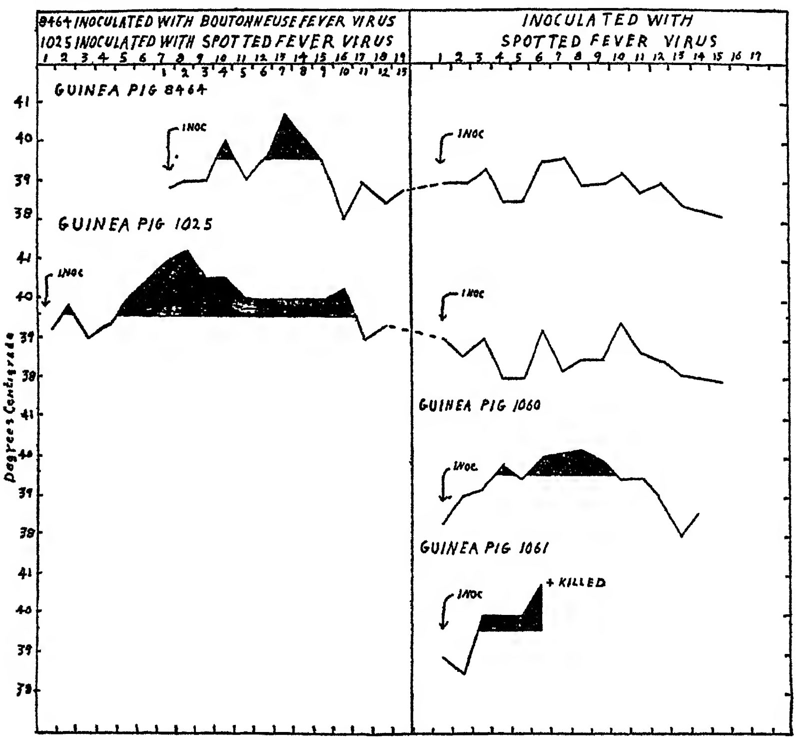

CHART 1 —Cross immunity test—Daily temperature records

Through the kindness of Professor Brumpt the author has had the opportunity to compare immunologically a strain of virus of boutonneuse fever and a strain of virus of Rocky Mountain spotted fever, eastern type, isolated from a human case which occurred in the State of Virginia.

Six *Rhipicephalus sanguineus* ticks were received from Professor Brumpt. These ticks were infected with the virus of boutonneuse fever and when received were incubated at 37° C. for 24 hours and then allowed to feed on a guinea pig. After feeding 9 days the ticks,

[2] Brumpt, E C R Soc de Biol, 1932, 23 1197

after being washed in bichloride of mercury and sterile saline solution, were emulsified in sterile salt solution and inoculated into two guinea pigs. In this manner a febrile condition was established and carried in guinea pigs for four generations. After four generations of guinea-pig passage the virus was lost. Culture media inoculated with the cardiac blood of these guinea pigs at the time of transfer were consistently negative.

The accompanying charts illustrate some of the cross-immunity tests in the guinea pig between the two viruses

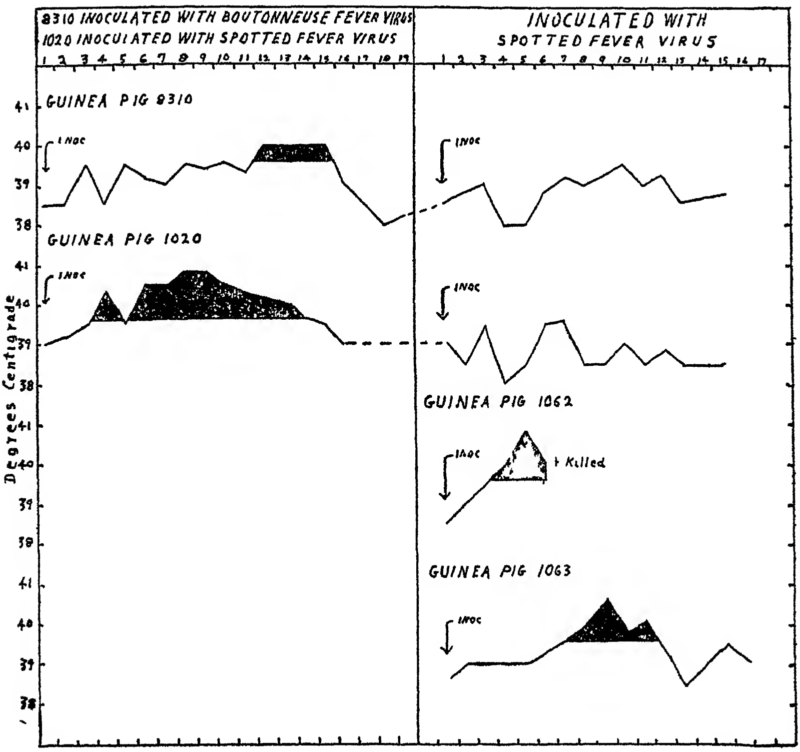

CHART 2.—Cross immunity test—Daily temperature records

In tests 1 and 2 immune boutonneuse fever guinea pigs were tested for immunity to the virus of Rocky Mountain spotted fever.

Guinea pig 8464, chart 1, six days after recovery from a slight febrile reaction following an inoculation with the virus of boutonneuse fever, was inoculated with the virus of Rocky Mountain spotted fever. Following the second inoculation, guinea pig 8464 failed to react, while two fresh control guinea pigs (1060 and 1061) reacted. The test was further controlled by the failure of an immune spotted fever guinea pig (1025) to react to an inoculation with the same test material.

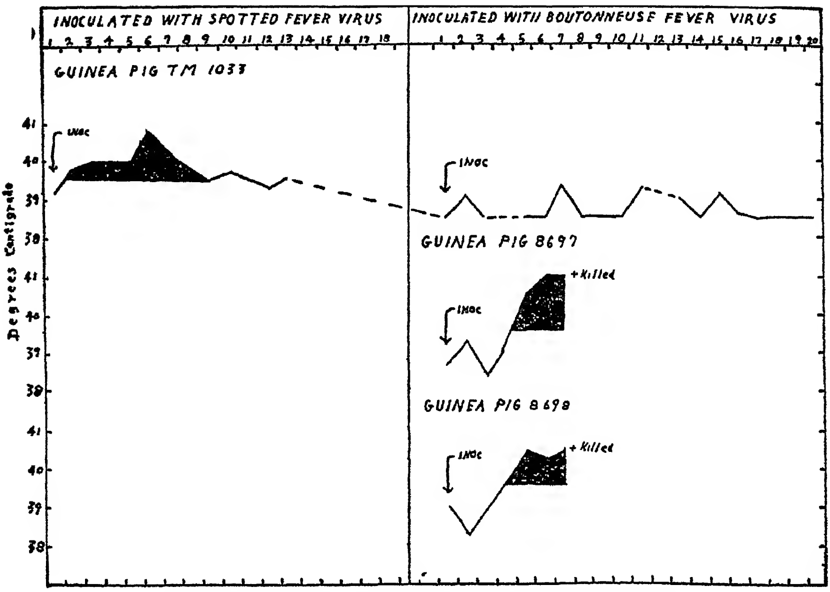

CHART 3.—Cross immunity test—Daily temperature records

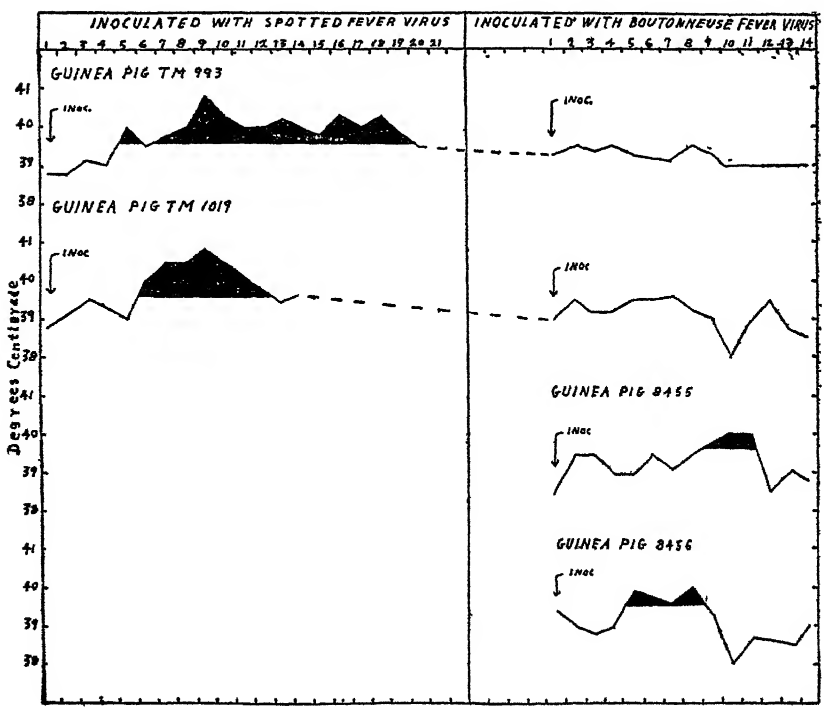

CHART 4.—Cross immunity test—Daily temperature records.

Guinea pig 8310, chart 2, reacted with a 4-day febrile period to an inoculation with the virus of boutonneuse fever. Six days after this reaction the guinea pig was inoculated with the virus of spotted fever along with two fresh guinea pigs (1062 and 1063) and an immune spotted fever guinea pig (1020). Guinea pig 8310 and the immune spotted fever guinea pig failed to react, while the two fresh guinea pigs reacted.

In tests 3 and 4, immune spotted fever guinea pigs were tested for immunity to the virus of boutonneuse fever.

Guinea pig TM 1033, chart 3, 17 days after a reaction due to the virus of Rocky Mountain spotted fever, was inoculated with the virus of boutonneuse fever. Two fresh guinea pigs (8697 and 8698) were inoculated as controls. The immune spotted fever guinea pig failed to react, while the fresh guinea pigs reacted.

Two guinea pigs (TM 993 and TM 1019) chart 4, after recovery from reactions produced by the virus of spotted fever, were inoculated with the virus of boutonneuse fever. These two immune spotted fever guinea pigs failed to react, while two fresh control guinea pigs (8455 and 8456) reacted.

These tests suggest that boutonneuse fever and Rocky Mountain spotted fever are immunologically identical. In comparing the tests of Brumpt and those here reported, it will be noted that in the former a temperature of approximately 38.5° C. was considered the upper limit of normal temperature for the guinea pig, while in the latter a temperature of 39.6° C. was considered the upper limit of normal temperature of the guinea pig.[3]

DEATHS DURING WEEK ENDED APRIL 22, 1933

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Apr 22, 1933	Corresponding week, 1932
Data from 85 large cities of the United States		
Total deaths	7,891	8,375
Deaths per 1,000 population, annual basis	11 0	12 0
Deaths under 1 year of age	553	634
Deaths under 1 year of age per 1,000 estimated live births [1]	48	53
Deaths per 1,000 population, annual basis, first 16 weeks of year	12 1	12 6
Data from industrial insurance companies		
Policies in force	68,438,840	73,603,968
Number of death claims	13,598	15,009
Death claims per 1,000 policies in force, annual rate	10 4	10.7
Death claims per 1,000 policies, first 16 weeks of year, annual rate	11 0	10.7

[1] 1933, 81 cities, 1932, 80 cities

[3] Weil, E., and Breinl, F (Jour Inf. Dis, 1923, 33 64), in discussing the normal temperature of the guinea pig made the following statement. "As long as winter food is given, 39.1° C. can be considered as normal. When summer food is given, the normal temperature rises to 39.6° C."

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended April 29, 1933, and April 30, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended April 29, 1933, and April 30, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Apr. 29, 1933	Week ended Apr. 30, 1932	Week ended Apr. 29, 1933	Week ended Apr. 30, 1932	Week ended Apr. 29, 1933	Week ended Apr. 30, 1932	Week ended Apr. 29, 1933	Week ended Apr. 30, 1932
New England States:								
Maine	1	1	2	25	4	290	0	0
New Hampshire		1			1	22	0	0
Vermont					5	97	0	0
Massachusetts	21	32	3	5	578	854	2	1
Rhode Island	2	2			1	132	0	0
Connecticut	7	5	5	5	273	158	0	0
Middle Atlantic States:								
New York	54	114	[1] 15	[1] 25	3, 632	2, 045	3	4
New Jersey	20	26	7	14	1, 869	711	3	0
Pennsylvania [2]	44	70			1, 447	1, 725	0	13
East North Central States:								
Ohio	30	60	111	117	577	3, 445	2	2
Indiana	13	16	32	45	217	98	3	5
Illinois	21	53	13	90	704	1, 275	19	5
Michigan	18	18	3	10	1, 107	2, 010	4	1
Wisconsin	5	5	38	52	429	2, 320	1	2
West North Central States:								
Minnesota	3	5			848	24	1	0
Iowa	8	4			57	6	4	2
Missouri	32	17	28	22	228		3	2
North Dakota		2			26	18	2	0
South Dakota	1	2			12	3	0	0
Nebraska	8	6			55	2	0	1
Kansas	7	7		2	341	453	0	1
South Atlantic States:								
Delaware		10			6	1	0	0
Maryland [3]	3	15	11	26	15	48	0	2
District of Columbia	3	7		1	11	19	0	0
Virginia [4]	11				279		3	1
West Virginia	5	6		114	106	439	1	2
North Carolina	25	20	22	312	821	608	3	0
South Carolina	9	5	269	1, 259	266	176	0	0
Georgia [4]	6	4		95	144	58	2	3
Florida	9	8	2	13	88	13	0	0
East South Central States:								
Kentucky	7	17		135	105	57	0	1
Tennessee	6	8	61	358	63	56	2	4
Alabama [4]	3	10	49	161	135	18	0	2
Mississippi	4	11					0	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended April 29, 1933, and April 30, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Apr. 29, 1933	Week ended Apr. 30, 1932	Week ended Apr. 29, 1933	Week ended Apr. 30, 1932	Week ended Apr. 29, 1933	Week ended Apr. 30, 1932	Week ended Apr. 29, 1933	Week ended Apr. 30, 1932
West South Central States:								
Arkansas	10		8	35	475	2	2	3
Louisiana	8	25	1	19	41	37	0	0
Oklahoma [5]	10	14	24	105	65	57	1	2
Texas [4]	57	24	323	76	1,642	422	2	0
Mountain States:								
Montana [2]	1			17	17	88	0	0
Idaho		1		2	18		0	0
Wyoming [2]	2				17	24	1	0
Colorado	1	4	29		10	151	0	1
New Mexico	4	23		2	24	33	0	0
Arizona		3		4	77	1	0	3
Utah [3]		2			4	1	0	0
Pacific States:								
Washington	2	3		1	93	258	0	0
Oregon	5		35	37	85	361	0	1
California	47	84	36	74	1,315	603	4	5
Total	542	750	1,127	3,258	18,333	19,219	68	69

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Apr. 29, 1933	Week ended Apr. 30, 1932	Week ended Apr. 29, 1933	Week ended Apr. 30, 1932	Week ended Apr. 29, 1933	Week ended Apr. 30, 1932	Week ended Apr. 29, 1933	Week ended Apr. 30, 1932
New England States:								
Maine	0	0	18	35	0	0	0	1
New Hampshire	0	0	27	13	0	0	0	2
Vermont	0	0	6	4	0	0	0	0
Massachusetts	0	1	365	520	0	0	2	1
Rhode Island	0	0	24	58	0	0	1	1
Connecticut	0	0	134	130	9	0	1	0
Middle Atlantic States:								
New York	1	0	762	1,692	0	9	14	14
New Jersey	0	1	223	361	0	0	3	2
Pennsylvania [3]	1	1	820	1,025	0	0	9	10
East North Central States:								
Ohio	2	1	1,194	527	5	41	7	13
Indiana	1	1	153	91	7	7	1	3
Illinois	0	3	411	407	4	13	5	3
Michigan	1	1	668	453	1	2	1	2
Wisconsin	2	1	125	65	1	1	1	2
West North Central States:								
Minnesota	0	0	90	126	0	1	1	0
Iowa	0	0	29	62	10	62	0	0
Missouri	0	0	88	56	4	3	3	3
North Dakota	1	0	1	17	0	6	0	0
South Dakota	0	1	5	2	0	0	1	0
Nebraska	0	0	32	13	2	13	0	1
Kansas	0	0	47	35	1	2	1	2
South Atlantic States:								
Delaware	0	0	15	18	0	0	0	1
Maryland [3]	0	0	94	120	0	0	4	4
District of Columbia	0	0	12	35	0	0	0	0
Virginia [4]	1		52		0		4	
West Virginia	0	0	25	23	2	3	2	13
North Carolina	1	2	63	81	0	3	7	1
South Carolina	1	2	1	3	0	0	5	7
Georgia [4]	0	1	6	13	0	0	7	9
Florida	0	0	7	4	0	1	5	3
East South Central States:								
Kentucky	1	1	55	108	1	1	12	11
Tennessee	0	2	45	41	1	13	3	6
Alabama [4]	0	0	13	7	2	12	3	11
Mississippi	0	0	4	8	0	14	3	3

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended April 29, 1933, and April 30, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Apr. 29, 1933	Week ended Apr. 30, 1932	Week ended Apr. 29, 1933	Week ended Apr. 30, 1932	Week ended Apr 29, 1933	Week ended Apr. 30, 1932	Week ended Apr. 29, 1933	Week ended Apr. 30, 1932
West South Central States:								
Arkansas	0	0	3	3	4	12	1	1
Louisiana	1	1	7	10	0	5	15	17
Oklahoma [5]	0	0	9	18	8	6	8	2
Texas [4]	1	2	41	22	67	45	9	7
Mountain States:								
Montana [2]	0	0	14	15	0	12	2	3
Idaho	0	0	1	1	3	0	0	0
Wyoming [2]	0	0	18	5	0	1	0	3
Colorado	0	0	24	30	1	0	0	0
New Mexico	0	0	11	6	0	0	3	1
Arizona	0	0	12	2	0	0	0	1
Utah [3]	0	0	2	3	0	0	0	0
Pacific States:								
Washington	0	0	36	31	25	20	1	3
Oregon	1	0	19	4	6	15	2	2
California	0	2	128	151	32	5	3	4
Total	16	24	5,945	6,456	202	328	150	173

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended Apr. 29, 1933, 8 cases: 1 case in Pennsylvania, 6 cases in Montana, and 1 case in Wyoming.
[3] Week ended Friday.
[4] Typhus fever, week ended Apr. 29, 1933, 14 cases: 1 case in Virginia, 5 cases in Georgia, 2 cases in Alabama, and 6 cases in Texas.
[5] Figures for 1933 are exclusive of Oklahoma City and Tulsa and for 1932 are exclusive of Tulsa only.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week:

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
March 1933										
Arkansas	8	26	197	34	527	55	0	42	48	6
California	20	269	416	1	1,274	4	10	1,027	216	35
Idaho		4	6		142		0	30	59	11
Kansas	13	25	12		1,283		1	273	2	7
Montana	3	5	88		205		1	50	3	11
Nevada	1	1	38		2		0	17	1	1
New Mexico	5	37	19		42		1	55	0	7
Oklahoma [1]	9	47	367	51	240	8	2	103	21	13
Oregon		5	191		403		0	77	17	5
Texas	9	296	726	263		6	3	185		35
Virginia	8	58	1,272	9	1,882	6	1	204	4	25
Washington	2	22	210		226		4	218	30	5
Wisconsin	7	17	366		1,676		1	585	47	4

[1] Exclusive of Oklahoma City and Tulsa.

March 1933

	Cases
Actinomycosis:	
California	4
Kansas	1
Botulism:	
California	1
Chicken pox:	
Arkansas	156
California	3, 636
Idaho	52
Kansas	587
Montana	122
Nevada	21
New Mexico	57
Oklahoma [1]	89
Oregon	132
Virginia	361
Washington	736
Wisconsin	2, 042
Conjunctivitis:	
New Mexico	2
Diarrhea and dysentery:	
Virginia	112
Dysentery:	
California (amebic)	7
California (bacillary)	10
Oklahoma [1]	5
Food poisoning:	
California	118
German measles:	
Arkansas	48
California	92
Kansas	12
Montana	3
New Mexico	3
Washington	16
Wisconsin	15
Granuloma, coccidioidal:	
California	6
Impetigo contagiosa:	
Montana	17
Oregon	38
Washington	1
Leprosy:	
Washington	2
Lethargic encephalitis:	
California	3
Kansas	3
Montana	3

Lethargic encephalitis—Continued	Cases
New Mexico	1
Virginia	2
Wisconsin	1
Mumps:	
Arkansas	74
California	1, 419
Idaho	55
Kansas	950
Montana	32
New Mexico	81
Oklahoma [1]	63
Oregon	11
Washington	259
Wisconsin	556
Ophthalmia neonatorum:	
Arkansas	1
California	3
Virginia	1
Paratyphoid fever:	
California	4
Idaho	3
Texas	2
Virginia	1
Psittacosis:	
California	1
Puerperal septicemia:	
New Mexico	1
Washington	2
Rabies in animals:	
California	53
Washington	6
Rabies in man:	
Oklahoma [1]	1
Rocky Mountain spotted fever:	
California	1
Idaho	2
Scabies:	
Kansas	3
Oregon	46
Septic sore throat:	
California	16
Kansas	5
Montana	8
New Mexico	1
Oklahoma [1]	14

Septic sore throat—Contd.	Cases
Oregon	7
Virginia	7
Washington	4
Tetanus:	
California	5
Kansas	1
Virginia	1
Trachoma:	
Arkansas	5
California	22
Montana	3
New Mexico	11
Oklahoma [1]	6
Virginia	2
Trichinosis:	
California	4
Tularaemia:	
Arkansas	1
Kansas	1
Virginia	3
Wisconsin	1
Typhus fever:	
Virginia	1
Undulant fever:	
California	8
Kansas	3
Montana	2
Virginia	2
Wisconsin	1
Vincent's angina:	
Kansas	5
Oklahoma [1]	6
Oregon	7
Whooping cough:	
Arkansas	62
California	2, 234
Idaho	17
Kansas	202
Montana	38
Nevada	1
New Mexico	23
Oklahoma [1]	64
Oregon	63
Virginia	166
Washington	32
Wisconsin	733

PLAGUE IN THE UNITED STATES AND POSSESSIONS DURING 1932

During the year 1932 cases of plague in human beings and plague infection in rodents were reported in the United States and its possessions as follows:

Cases of human plague

In continental United States no case of plague occurred during 1932.

In Hawaii Territory, two fatal cases occurred in February 1932 in Hamakua District, island of Hawaii. In Makawao District, island of Maui, 3 fatal cases occurred during the year, 1 case each in March, July, and September. Another case of plague, which recovered, was reported in Makawao District, Maui, in August.

Plague-infected rodents

	Number
California:	
Los Angeles, rats—	
April, 1932	1
May 1932	2
June 1932	1
San Benito County, ground squirrels—	
August 1932	[illegible]

Hawaii Territory, rats:	Number
Hawaii Island, Hamakua District—	
February 1932	1
May 1932	2
November 1932	2
December 1932	11
Maui Island, Makawao District—	
February 1932	4
August 1932	4
September 1932	1

[1] Exclusive of Oklahoma City and Tulsa.

WEEKLY REPORTS FROM CITIES

City reports for week ended April 22, 1933

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	0	-------	0	0	3	3	0	0	1	9	20
New Hampshire:											
Concord	0	-------	0	0	1	0	0	1	0	0	8
Manchester	0	-------	0	0	2	5	0	0	0	0	11
Nashua	0	-------	0	2	0	0	0	0	0	0	-------
Vermont											
Barre	0	-------	0	0	0	0	0	1	0	10	2
Burlington	0	-------	0	0	0	2	0	0	0	0	11
Massachusetts.											
Boston	2	2	2	236	22	78	0	16	3	25	232
Fall River	0	-------	0	1	1	6	0	2	0	10	34
Springfield	0	1	1	2	0	9	0	2	0	18	34
Worcester	0	-------	0	11	3	25	0	0	0	0	52
Rhode Island:											
Pawtucket	0	-------	0	0	0	1	0	0	0	0	17
Providence	1	-------	0	1	4	13	0	3	0	8	80
Connecticut:											
Bridgeport	0	-------	0	36	3	11	0	3	0	1	31
Hartford	0	-------	0	4	2	25	0	2	0	0	42
New Haven	0	-------	0	5	2	7	0	1	0	5	40
New York:											
Buffalo	5	-------	1	83	18	36	0	9	0	24	146
New York	55	11	7	1,998	166	259	0	90	8	108	1,475
Rochester	0	-------	0	1	6	19	0	3	0	4	76
Syracuse	0	-------	0	0	4	19	0	1	1	4	50
New Jersey:											
Camden	0	-------	0	3	4	15	0	1	0	0	36
Newark	1	4	0	410	8	31	0	8	0	15	103
Trenton	0	-------	0	37	3	9	0	2	1	0	36
Pennsylvania:											
Philadelphia	2	4	3	365	37	127	0	27	1	17	517
Pittsburgh	2	3	2	1	18	56	0	8	0	25	141
Reading	1	-------	0	45	3	9	0	0	0	10	26
Scranton	0	-------	-------	0	-------	12	0	-------	0	1	-------
Ohio:											
Cincinnati	1	-------	1	6	6	18	0	9	0	1	114
Cleveland	14	45	1	2	8	171	0	10	1	33	165
Columbus	0	1	1	17	6	14	0	3	0	2	68
Toledo	2	1	1	328	5	107	0	3	0	2	54
Indiana:											
Fort Wayne	5	-------	1	1	0	7	0	1	0	0	22
Indianapolis	1	-------	0	127	7	28	1	2	0	6	-------
South Bend	0	-------	0	6	2	6	0	1	0	1	14
Terre Haute	0	-------	0	7	1	15	0	1	0	4	20
Illinois:											
Chicago	5	-------	3	567	36	313	4	33	1	12	589
Springfield	2	-------	0	1	2	3	0	0	0	0	19
Michigan:											
Detroit	13	-------	2	514	16	135	0	19	0	106	299
Flint	0	6	0	73	2	5	0	1	0	5	25
Grand Rapids	0	-------	0	3	3	8	0	1	0	39	31
Wisconsin:											
Kenosha	0	-------	0	0	0	8	1	0	0	14	8
Madison	0	-------	-------	139	-------	2	0	-------	0	2	-------
Milwaukee	0	-------	0	5	5	32	0	2	0	31	108
Racine	0	-------	0	0	1	2	0	0	0	10	15
Superior	0	-------	0	0	1	0	0	1	0	5	11
Minnesota:											
Duluth	0	-------	0	5	1	1	0	0	0	56	25
Minneapolis	2	-------	0	90	2	28	0	2	0	50	107
St. Paul	0	2	2	708	4	22	0	1	0	93	73
Iowa:											
Des Moines	7	-------	-------	0	-------	9	0	-------	0	0	27
Sioux City	2	-------	-------	3	-------	5	0	-------	0	4	-------
Waterloo	1	-------	-------	0	-------	1	2	-------	0	1	-------
Missouri:											
Kansas City	2	-------	0	110	8	48	0	6	0	0	73
St. Joseph	1	-------	0	35	5	0	0	1	0	1	29
St. Louis	12	-------	-------	36	7	21	0	16	0	2	189

City reports for week ended April 22, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
North Dakota:											
Fargo	0	-------	1	3	0	1	0	1	0	0	5
Grand Forks	0	-------	0	0	0	1	0	0	0	0	-------
South Dakota:											
Aberdeen	0	-------	-------	0	-------	0	0	-------	0	0	-------
Nebraska											
Omaha	3	-------	0	31	3	8	1	1	0	3	44
Kansas:											
Topeka	0	-------	0	104	1	2	0	0	0	5	10
Wichita	0	-------	0	1	5	0	0	0	1	0	32
Delaware											
Wilmington	1	-------	0	4	0	3	0	1	0	2	29
Maryland.											
Baltimore	4	1	2	5	29	58	0	19	1	10	247
Cumberland	0	-------	0	0	0	0	0	0	0	0	12
Frederick	0	-------	0	0	0	1	0	0	0	0	3
District of Col:											
Washington	2	1	1	8	10	15	0	14	0	3	171
Virginia:											
Lynchburg	0	-------	0	2	3	0	0	0	0	3	14
Norfolk	0	-------	0	10	1	2	0	1	0	0	23
Richmond	1	-------	0	1	3	4	0	1	0	0	45
Roanoke	0	-------	0	61	0	1	0	1	0	0	15
West Virginia:											
Charleston	1	-------	0	2	0	1	0	0	0	2	7
Huntington	0	-------	-------	3	-------	4	1	-------	0	0	-------
Wheeling	0	-------	0	7	1	4	0	0	0	17	23
North Carolina:											
Raleigh	0	-------	0	1	1	1	0	1	0	0	15
Wilmington	0	-------	0	124	0	0	0	0	0	2	4
Winston-Salem	0	2	0	2	2	6	0	1	0	3	20
South Carolina:											
Charleston	1	9	0	0	0	1	0	3	0	0	19
Columbia	0	-------	1	0	1	0	0	0	0	0	21
Greenville	0	-------	0	6	1	0	0	0	0	0	9
Georgia:											
Atlanta	2	15	1	44	7	3	0	5	0	23	80
Brunswick	0	-------	0	0	0	0	0	0	0	0	2
Savannah	1	38	0	0	0	0	0	2	1	1	25
Florida:											
Miami	1	-------	0	0	0	0	0	0	0	9	27
Tampa	1	-------	0	0	2	0	0	1	0	5	27
Kentucky:											
Ashland	0	-------	0	15	0	0	0	0	1	3	-------
Lexington	0	1	0	6	2	2	0	3	0	2	14
Louisville	3	1	2	3	4	21	0	2	0	6	45
Tennessee:											
Memphis	0	-------	2	21	6	0	0	6	2	13	82
Nashville	0	-------	1	4	0	1	0	3	0	1	31
Alabama:											
Birmingham	3	1	1	4	3	3	0	3	2	0	63
Mobile	0	-------	0	15	3	1	0	0	0	0	25
Montgomery	1	-------	-------	-------	-------	0	0	-------	0	5	-------
Arkansas:											
Fort Smith	0	-------	-------	0	-------	0	0	0	0	1	-------
Little Rock	0	-------	0	102	1	1	4	0	0	0	1
Louisiana.											
New Orleans	8	1	0	14	12	9	1	12	[1] 15	2	130
Shreveport	1	-------	0	0	1	2	0	3	1	0	37
Oklahoma:											
Tulsa	0	-------	-------	43	-------	3	4	-------	0	9	-------
Texas:											
Dallas	4	-------	0	-------	4	13	0	4	0	11	69
Fort Worth	0	-------	1	29	5	4	0	2	0	0	30
Galveston	0	-------	0	0	1	0	0	0	0	0	7
Houston	17	-------	0	4	8	0	1	2	0	0	59
San Antonio	2	-------	1	10	0	0	0	9	1	2	54
Montana:											
Billings	0	-------	0	0	0	0	0	0	0	0	8
Great Falls	0	-------	0	1	0	1	0	0	0	1	7
Helena	0	-------	0	6	0	0	0	0	0	0	3
Missoula	0	-------	0	1	0	0	0	0	0	0	1

[1] 13 cases nonresidents.

City reports for week ended April 22, 1933—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Colorado:											
Denver	4	31	2	4	6	8	0	5	0	5	64
Pueblo	0	-------	0	0	0	1	0	1	0	4	9
New Mexico:											
Albuquerque	0	-------	0	1	0	1	0	4	1	2	7
Utah:											
Salt Lake City	0	-------	0	6	1	1	0	1	0	19	25
Nevada:											
Reno	0	-------	0	0	0	0	0	0	0	0	3
Washington:											
Seattle	1	-------	-------	11	-------	14	1	-------	0	4	-------
Spokane	0	-------	-------	0	-------	0	2	-------	0	0	-------
Tacoma	0	-------	0	0	3	5	2	0	0	0	19
Oregon:											
Portland	2	-------	1	4	2	8	0	0	0	1	67
Salem	0	2	-------	30	-------	0	0	-------	0	0	-------
California:											
Los Angeles	19	8	0	585	13	41	45	18	2	67	245
Sacramento	0	-------	0	1	1	0	0	5	3	84	23
San Francisco	0	1	0	2	6	9	0	10	0	80	166

State and city	Meningococcus meningitis Cases	Meningococcus meningitis Deaths	Poliomyelitis cases
New York:			
Buffalo	0	1	0
New York	5	2	0
New Jersey:			
Newark	0	0	1
Pennsylvania:			
Philadelphia	0	0	2
Pittsburgh	0	0	1
Ohio:			
Cincinnati	1	1	0
Indiana:			
Indianapolis	1	0	0
Illinois:			
Chicago	19	5	0
Michigan:			
Detroit	1	0	0
Iowa:			
Sioux City	2	0	0
Waterloo	1	0	0

State and city	Meningococcus meningitis Cases	Meningococcus meningitis Deaths	Poliomyelitis cases
Missouri:			
Kansas City	0	1	0
St. Joseph	2	0	0
St. Louis	1	1	0
Nebraska:			
Omaha	5	1	0
Maryland:			
Baltimore	1	0	0
Cumberland	1	1	0
District of Columbia:			
Washington	2	0	0
Louisiana:			
New Orleans	1	1	0
Washington:			
Seattle	1	0	0
California:			
Los Angeles	1	2	0
San Francisco	0	0	1

Lethargic encephalitis.—Cases: New York, 1; Philadelphia, 1; Pittsburgh, 1.
Pellagra.—Cases: Baltimore, 1; Washington, 1; Charleston, S.C., 4; Savannah, 2; Los Angeles, 2.
Typhus fever.—Cases: Charleston, S.C., 1; Atlanta, 1; Savannah, 2.

FOREIGN AND INSULAR

CANADA

Quebec Province—Vital statistics—1932.—During the year 1932, births and deaths were reported in the Province of Quebec, Canada, as follows:

Number of births	81, 750
Birth rate per 1,000 population	27. 9
Number of deaths	32, 966
Death rate per 1, 000 population	11. 3
Infant mortality per 1,000 births	93. 8

CUBA

Habana—Communicable diseases—Four weeks ended April 22, 1933.—During the four weeks ended April 22, 1933, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	14	4	Scarlet fever	8	2
Malaria	3		Tuberculosis	5	1
Rabies	.1	1	Typhoid fever	6	3

CZECHOSLOVAKIA

Communicable diseases—February 1933.—During the month of February 1933 certain communicable diseases were reported in Czechoslovakia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	14	6	Poliomyelitis	7	1
Chicken pox	220	1	Puerperal fever	40	16
Diphtheria	2, 768	150	Rabies	1	
Dysentery	6	1	Scarlet fever	1, 664	22
Influenza	11, 553	130	Trachoma	123	
Lethargic encephalitis	2	1	Typhoid fever	368	40
Malaria	1		Typhus fever	13	
Paratyphoid fever	6				

ITALY

Communicable diseases—Four weeks ended November 13, 1932.—During the four weeks ended November 13, 1932, cases of certain communicable diseases were reported in Italy as follows:

Disease	Oct 17-23		Oct 24-30		Oct. 31-Nov 6		Nov. 7-13	
	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected
Anthrax	41	32	34	31	38	32	30	27
Cerebrospinal meningitis	5	5	11	11	7	6	7	6
Chicken pox	52	34	62	35	62	35	94	44
Diphtheria and croup	700	345	835	376	697	359	748	355
Dysentery	68	27	24	14	22	13	23	14
Lethargic encephalitis	1	1	2	2	1	1	1	1
Measles	572	134	578	143	659	148	761	135
Poliomyelitis	27	25	24	21	17	16	26	26
Scarlet fever	526	210	665	220	495	197	499	178
Typhoid fever	1,669	693	1,530	631	1,219	588	1,137	518

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

(NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for Apr. 28, 1933, pp. 459-470. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued May 26, 1933, and thereafter, at least for the time being, in the issue published on the last Friday of each month.)

Cholera

Philippine Islands.—During the week ended April 29, 1933, 38 cases of cholera with 35 deaths were reported in Ormoc, Leyte Province, Philippine Islands.

During the month of March 1933, 186 cases of cholera with 144 deaths were reported in the Province of Samar, Philippine Islands.

X

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UNITED STATES PUBLIC HEALTH SERVICE

HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst. Surg. Gen. R. C. WILLIAMS, *Chief of Division*

The PUBLIC HEALTH REPORTS are issued weekly by the United States Public Health Service through its Division of Sanitary Reports and Statistics, pursuant to acts of Congress approved February 15, 1893, and August 14, 1912.

They contain: (1) Current information of the prevalence and geographic distribution of preventable diseases in the United States in so far as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other communicable diseases throughout the world. (2) Articles relating to the cause, prevention, or control of disease. (3) Other pertinent information regarding sanitation and the conservation of the public health.

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PUBLIC HEALTH REPORTS

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RELATIONSHIP BETWEEN ROCKY MOUNTAIN SPOTTED FEVER AND "EXANTHEMATIC TYPHUS OF SAO PAULO"

By R. E. Dyer, *Surgeon, United States Public Health Service*

In the environs of Sao Paulo, Brazil, there occurs a disease which has been recognized as belonging to the typhus group and it has been named "Exanthematic Typhus of Sao Paulo." This disease has been studied extensively by Monteiro and by Piza, Meyer, and Gomez.

The epidemiology of the disease indicates that a tick is the transmitting agent, and experimentally the tick has been shown to be capable of transmitting the infection. In addition, the clinical picture in man resembles Rocky Mountain spotted fever, and the reactions of laboratory animals following injection with the Sao Paulo virus are quite similar to the reactions produced by Rocky Mountain spotted fever. The South American authors have noted the resemblance of this disease to Rocky Mountain spotted fever, and it is through the courtesy of one of them that this report is possible.

In the middle of March 1933 Dr. J. L. Monteiro, of the Instituto Butantan, Sao Paulo, fed 12 ticks (*Amblyomma cajennense*) on guinea pigs which were infected with the Sao Paulo virus and sent them to the author. On receipt, five of the ticks were alive. These ticks were placed on a guinea pig for 48 hours, during which time three of them attached. The ticks were then removed from the guinea pig, washed in alcohol, emulsified in salt solution, and injected intraperitoneally into six guinea pigs. These six animals developed febrile reactions on the second day after inoculation, while the guinea pig on which the ticks fed developed fever 8 days after the ticks had been removed. By transfer of blood the virus has been perpetuated in animals and is now in its ninth generation. All of the 99 guinea pigs in the first seven generations have developed febrile reactions following incubation periods of 2 to 4 days following inoculation of 2 cc of blood virus. The fever mounts rapidly in the guinea pig and reaches or exceeds 41° C. in many of the animals. If death does not intervene, the febrile reaction lasts about 8 days. The mortality rate has so far been well over 90 percent. It is noted that the incubation period, febrile reaction, and mortality rate are what might be expected with a

fairly virulent strain of spotted fever. Approximately half of the guinea pigs have developed a scrotal reaction which is like the reaction seen in the western type of spotted fever in guinea pigs and is unlike that seen in endemic typhus. On autopsy of the guinea pigs killed during the height of the disease or examined after death from the disease, the spleens have been found to be enlarged from 2 to 5 times, dark red, and smooth. The splenic reactions noted are grossly identical with those seen in spotted fever. Blood cultures have been made from each animal killed for transfer purpose and these have been negative for bacterial growth.

In rabbits the virus produces fever and the scrotal reaction described for spotted fever and also produces agglutinins for *B. proteus* X_{19}.

Guinea pigs which have recovered from attacks of European typhus have been found to be nonimmune to the Sao Paulo virus, while guinea pigs immune to spotted fever are immune to the Sao Paulo virus. One monkey which had recovered from spotted fever has proved insusceptible to the Sao Paulo virus, and a monkey that recovered from the disease caused by the Sao Paulo virus was later found immune to spotted fever.

The descriptions of the epidemiology of the Sao Paulo disease, the clinical picture in the human being and in the laboratory animal as given by the South American authors, and the comparison of this virus with the viruses of spotted fever and typhus indicate that the Sao Paulo disease is identical with Rocky Mountain spotted fever.

MATERNAL, FETAL, AND NEONATAL MORTALITY AMONG 1,815 HOSPITALIZED AMERICAN INDIANS*

By E. Blanche Sterling, *Acting Assistant Surgeon, United States Public Health Service*

The group of Indian women who form the basis of this study received medical care in hospitals maintained by the Federal Government for the benefit of the Indians. While formerly it was often a difficult matter to induce an Indian woman to enter a hospital for delivery or for the care of an abortion, the fact that over 1,800 records of such cases were obtained in the 17 months from July 1, 1930, to November 30, 1931, is proof of the change in this respect which has come about in recent years.

The group represented many tribes in widely separated sections of the country. The tribes contributing the largest numbers were the Chippewas (351), the Sioux (331), and the Navajos (136), the three tribes most important numerically among the Indian population enumerated on April 1, 1930. When all the tribes are considered, it

*From the Office of Child Hygiene, U.S. Public Health Service, and the Medical Division, Office of Indian Affairs.

is seen that the larger proportion were northern Indians, but a very fair proportion were southern. Of course this does not necessarily mean that more northern Indians are hospitalized, but simply that these particular records were available at the time of the study. All records of obstetrical cases on file in the Office of Indian Affairs at the time of the study were included.

DEGREE OF BLOOD AND AGE DISTRIBUTION

An interesting question which naturally arose in a study of hospitalized Indians concerned the degree of blood of the patients. Do Indians having an admixture of white blood take more kindly to hospitalization than do full-blooded Indians? In this particular group there was little difference. There were 923 women of mixed blood and 889 of full blood, with 3 of unknown blood. When, however, these numbers are compared with the total number of full- and mixed-blood individuals in the total enrolled Indian population, as shown later, it is seen that the proportion of full bloods seeking hospitalization is far less than that of the mixed bloods.

It was of equal interest to learn whether there appeared to be any relation between the age of the patient and the degree of blood with respect to hospitalization. Table 1 shows the number of women of full and of mixed blood in each age group.

TABLE 1.—*Degree of blood of 1,815 hospitalized American Indian women, by age*

Age	Degree of blood [1]						Percent of births in 1929, continental United States			
	Full		Mixed		Total		White		Colored	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Under 15	2	0.2	2	0.2	4	0.2	1,187	0.1	1,470	0.6
15 to 19	115	12.9	148	16.1	263	14.5	196,075	10.2	53,407	21.8
20 to 24	272	30.6	302	32.7	574	31.7	559,728	29.2	75,354	30.7
25 to 29	205	23.1	199	21.6	404	22.3	495,219	25.9	51,614	21.0
30 to 34	146	16.4	144	15.6	290	16.0	341,697	17.9	30,168	12.3
35 to 39	94	10.6	75	8.1	169	9.3	218,122	11.4	22,002	9.0
40 and over	47	5.3	49	5.3	96	5.3	79,245	4.1	7,431	3.0
Unknown	8	.9	4	.4	12	.7	23,227	1.2	3,996	1.6
All ages	889	100.0	923	100.0	1,812	100.0	1,914,500	100.0	245,445	100.0

[1] 3 women were of unknown blood—1 each in the 15 to 19, 20 to 24, and 30 to 34 age groups.

A study of table 1 shows that among the 841 mothers comprising the younger age groups (those under 25 years), 46.25 percent were full blood and 53.75 percent were of mixed blood. Of these young maternity cases the number of mixed blood exceeded by 7½ percent those of full blood.

In the older group (those women over 25 years) there were 959 cases, of whom 51.3 percent were full blood and 48.7 percent mixed

blood. In this group the full bloods exceeded the mixed bloods by 2.6 percent. In two of the age groups comprising the older division the full-blood women were very slightly in excess of the mixed bloods; in one the mixed bloods were very slightly in excess, and in one (35 to 39) there was an excess of 11.2 percent in favor of the full bloods.

The slight difference of 2.6 percent in favor of the full-blood women in the older age groups cannot be considered of much statistical significance; but it would be of considerable social significance if it were true that full-blooded women of a race whose ancestors were quite unaccustomed to the methods of modern scientific medicine seek hospitalization to quite as great an extent as those a part of whose blood comes from progenitors accustomed to the medical methods of the white race.

Unfortunately, it is difficult to obtain exact figures for the total Indian population, and practically impossible to secure data on the degree of blood of all the Indians in the United States The total Indian population in 1930 is given as 340,541, but of this number only 221,808 were actually enrolled and enumerated by the Indian Office. Indians enumerated by the Bureau of the Census where there are no Federal agencies, added to those whose numbers were obtained from special reports, censuses, or estimates, make up an estimated remainder of 118,733. Of this number there is no record of the racial purity of its members.

Of the 221,808 enrolled Indians, 146,462 were of full blood and 75,346 of mixed blood. In other words, approximately twice as many full-blood Indians were enrolled as were those of mixed blood. There are no means of knowing the proportion of mixed- and full-blood Indians in the estimated 118,733 of the Indian population, but it is thought that the mixed bloods are probably in the majority. This, if true, would lessen the disparity between the two groups but could not be expected to obliterate it entirely. However, since most of these hospital patients were enrolled Indians, it seems safe to say that, at this time, full-blood Indian women do not seek hospitalization to the same extent as do those of mixed blood.

Table 1 shows that the age distribution of the full- and mixed-blood Indians in this group are quite similar, and hence results for all ages are comparable.

When the age distribution of the births among the Indian women is compared with that among white women in the birth registration area in continental United States in 1929, it is found that apparently pregnancy occurs more frequently (about 40 percent) among very young Indian women (under 19) than among white women of a corresponding age. When compared with colored women, the percentage of pregnancy among the very young colored women is 50 percent

higher than among Indian women of the same age. In this respect the Indian race occupies a middle position between the white and colored. Almost 96 percent of the colored group were Negroes, with only 2 percent Indian, and smaller percentages of Japanese, Chinese, and other colored races. Hence, the colored group may be considered practically a Negro group.

TYPE OF DELIVERY

The records of these deliveries (exclusive of abortions) show that 86 percent were normal births. That is to say, in this proportion of the cases it was explicitly stated that the parturition was normal. If those cases are included in which the parturition was apparently normal (through lack of any statement indicating abnormality), though not explicitly stated to be normal, the proportion increases to 93 percent. The latter figure is believed to be more nearly correct, because the evidence indicated that instrumental delivery, unusual presentations, etc., were very likely to be recorded.

It is practically impossible to compare these figures with hospital deliveries in general, because apparently each hospital is a law unto itself. The prevailing practice usually reflects the attitude of the chief of the obstetrical service. If he is conservative and wishes to avoid interference as far as possible, the operative rate tends to be low; if the reverse is true, the rate tends to be high. It is generally agreed at this time that less interference with normal labor is much to be desired. Judging from the percentage of normal labors occurring in these Indian Service hospitals, it would seem that the staffs of these hospitals are in agreement with this cardinal principle of good obstetrics, or that Indian women to not take kindly to interference.

MULTIPLE BIRTHS

There were 12 cases of multiple births in this series. In 10 of these cases it was stated that the mother gave birth to twins. In the two remaining cases the statement was made that the birth was "multiple." There can scarcely be any question that these were also twin births, since triple and quadruple births occur so rarely that such an event would assuredly have been mentioned.

The occurrence of 12 cases of twin births in 1,815 pregnancies gives a rate of 1 in approximately 150 cases. According to the figures of Wappaeus, Veit, and Hellin (quoted by Williams)[1] this is a low rate. The rate per 1,000 live births in this group was 7.4, while in the birth registration area in continental United States in 1929 it was 11.8.

[1] Obstetrics By J. Whitridge Williams. D. Appleton & Co, New York. 1930

It may mean that this sample is too small to give a significant rate in this respect, or that there is actually a lower incidence of multiple births among Indian women. Four of the cases occurred in full-blood Indians; in eight the mothers were of mixed blood.

There were 3 stillbirths among the 12 pairs of twins. One 13-year-old mother of twins aborted at six months. One mother of 25 gave birth to premature twins, one living and one stillborn.

VENEREAL DISEASE

A discussion of venereal disease in this group has little actual value, because the Wassermann test was not a routine measure in every hospital. This was due to the lack of facilities in some of the hospitals. Such a discussion, however, does have some relative value. There were 39 cases of venereal disease in the group—36 cases of syphilis alone, 2 of gonorrhea alone, and 1 having both syphilis and gonorrhea. Twenty-two of the cases of venereal disease occurred in full-blood women; 17 in women of mixed blood.

The 37 cases of syphilis show that at least 2 percent of these women had a syphilitic infection. This is slightly less than the figure reported by Williams[2] for white women (2.5 percent) in his service at the Johns Hopkins Hospital. It must be remembered, however, that only a part of the Indian women were tested for syphilis. If all had been given the Wassermann or Kahn test, it is quite probable that the percentage would have surpassed that of the white group. Whether or not it would have reached that of the Negro race cannot even be surmised from the data at hand.

PREMATURE BIRTHS

Using the viability of the fetus as a criterion, its expulsion before the twenth-eighth week constitutes an abortion or miscarriage; at the twenty-eighth week or later, a premature birth is recorded.

In this group of Indian women there were 41 premature births—23 in mothers of full blood and 18 in those of mixed blood. The age distribution of these premature deliveries (table 2) shows little relation to degree of blood, except that among the full-blood women there is a larger percentage of premature births in the older age group (30 and over) than among the same age group in those of mixed blood. When all ages are considered, it is found that 2.6 percent of the full-blood women were delivered prematurely, as compared with 2 percent of those of mixed blood.

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[2] See footnote 1.

TABLE 2.—*Premature births among 1,815 hospitalized American Indian women, by age and degree of blood*

Age	Degree of blood		Age	Degree of blood	
	Full	Mixed		Full	Mixed
All ages	23	18	25 to 29	7	7
			30 to 34	5	1
Under 15	0	0	35 to 39	2	2
15 to 19	1	2	40 and over	3	1
20 to 24	4	4	Unknown	1	1

These 41 premature deliveries resulted in 19 stillbirths. Of the 25 children born alive (there were 3 multiple births), 12 died within the first week.

In 75 percent of the cases of premature delivery no possible cause was suggested. In a few, maternal morbidity was associ ated with the occurrence. In three cases there was a record of toxemia–eclampsia, preeclamptic toxemia, and nephritis. There wasone case each of pneumonia, syphilis, and heart disease. In one instance separation of the placenta was mentioned. In the case of preeclamptic toxemia, the mother died. The patient with combined mitral and aortic insufficiency died about a week after leaving the hospital. This death was not included in the maternal deaths, since it seemed best to include only those which occurred in the hospital. Having the after history of only a few, it did not seem permissible to include those in the study.

MATERNAL MORTALITY

There were 10 maternal deaths which the records indicate occurred in the hospital, giving a maternal mortality rate of 6.12 per 1,000 live births. This compares favorably with the latest published rate for the birth registration area in continental United States issued by the Bureau of the Census for 1929, which is 6.95 per 1,000 live births, including hospital and nonhospital cases. It should be noted, however, that seven of these women died within 15 days. If all the cases had been followed for a longer period, the death rate would have been more fairly comparable with that given by the Bureau of the Census for the country as a whole.

To measure properly the risks of maternity the maternal mortality rate should, in all fairness, be based on the total number of pregnancies. There is usually as much risk of dying from a pregnancy that results in a stillbirth as in one resulting in the birth of a living child. Indeed, abortion is one of the recognized factors tending to raise the maternal mortality rate.

In this series of cases, however, in which almost 7 percent of the women aborted, there were no maternal deaths following abortion. In

fact, when the maternal mortality rate is based upon all pregnancies rather than upon live births, the rate falls from 6.12 to 5.51.

Though there were no deaths following abortion, there were 4 still-births associated with this group of 10 maternal deaths. Of the still-born infants, 2 were full-blood Indians, and 2 were of mixed blood. Of the 10 maternal deaths, 6 were of full blood, 4 of mixed blood.

CAUSES OF MATERNAL DEATH

Of the 10 maternal deaths 6 were undoubtedly from true puerperal causes. Three of these were caused by septicemia, 1 was by pre-eclamptic toxemia, 1 was a case of placenta praevia with antepartum hemorrhage, and the sixth was an ectopic pregnancy with rupture of the right salpinx. The last two causes of death are very grave complications of pregnancy. The occurrence of an extra-uterine pregnancy or of an abnormal implantation of the placenta can neither be foreseen nor prevented. Even skill beyond the ordinary as well as favorable circumstances and excellent facilities sometimes fail to prevent loss of life.

In the 3 deaths from septicemia, 1 was a high forceps delivery, 1 was "delivered by version," and the third was probably a breech birth. There was one case of septicemia following an incomplete abortion in which the patient recovered. The puerperal death rate from septicemia was 1.84 per 1,000 live births. The death rate from puerperal septicemia in the registration area in continental United States in 1929 was 2.63. The latter figure, however, includes both hospital and nonhospital cases. It is possible, also, though scarcely probable, that a longer period of observation of the Indian women might have revealed other deaths from septicemia in women who left the hospital within a few days of delivery.

There was 1 maternal death from preeclamptic toxemia; but there were 12 other cases diagnosed as acute nephritis, toxemia, or eclampsia in which the mother survived. Hence the mortality from this group of cases cannot be considered high. These 13 cases comprised 8 full-blood women and 5 of mixed blood.

Four of the maternal deaths were quite definitely not due to puerperal causes, 1 woman dying of mitral insufficiency and 1 of cholecystitis. In the latter case, if the inflammation of the gall bladder was due to gallstones, the gravity of the condition may be assumed. Gallstones are considered always a serious complication of pregnancy.

There remain two cases in which the cause of maternal death would seem to be somewhat doubtful. One woman died from a condition diagnosed as "double pneumonia." The diagnosis is not questioned. The woman doubtless died of pneumonia, but it is possible that the case may have been a septic pneumonia rather than one caused by the pneumococcus.

In the remaining case the only comment following the record of the death was the word "syphilis." This disease, as a cause of maternal death, is so rare that one suspects some other cause must have existed.

MATERNAL MORBIDITY

Besides the case of septicemia and the 12 cases of nephritis, eclampsia, and toxemia which did not result fatally, various other morbid conditions occurred from which the mother recovered.

There were 9 cases of hemorrhage, occurring in 4 full-blood and 5 mixed-blood Indians. One fatal case of antepartum hemorrhage occurred with placenta praevia, as already stated. The other 8 cases—2 antepartum and 6 postpartum—recovered.

Among 12 cases of tuberculosis (all but one apparently pulmonary) among 8 full-blood and 4 mixed-blood women there was no puerperal death. In 1 case there was a stillborn child and in another the child died before the end of the week.

Five cases of pneumonia resulted less fortunately. As previously stated, one mother died. In one case an abortion occurred; in another a premature stillbirth; in a third, a neonatal death. In only one case—and that of the bronchial type—were both mother and child living when they left the hospital. In the pneumonia cases, 3 were of full blood and 2 were mixed.

There were 5 cases of organic heart disease, 1 mother dying in the hospital and another after her return home. The other 3 cases survived the ordeal of pregnancy and delivery.

Among other conditions present not connected with maternity were 2 cases of facial paralysis, 2 of diarrhea, and 1 case each of influenza, malaria, chicken pox, asthma, urticaria, acute pyelitis, chronic appendicitis, acute gastritis, and smallpox. None of these proved fatal.

ABORTIONS AND STILLBIRTHS

There were 195 failures in this series of pregnancies—10.7 percent of the 1,815 cases—made up of 127 abortions and 68 stillbirths. The total rate per 1,000 live births was 119.5. In estimating this rate, however, a fairer picture is obtained by basing the rate on all births rather than on live births alone. Usually this is synonymous with the number of pregnancies, but where there are multiple births these must be included in the total of all births. In this instance we have 1,827 fetuses, in all of which there was, in the beginning, the potentiality of survival. Using this figure we have a failure rate of 106.6 per 1,000 total births. This figure cannot be compared with the census figure for the country as a whole, because the reporting of stillbirths is lamentably inadequate and abortions are not reported. The still-

birth rate was 38.7 per 1,000 live births, or 37.2 when all births are considered.

CAUSES OF FETAL DEATH

Of the cause of the 127 cases of abortion little is known. In 92 percent no attempt is made to assign a cause except to say that in almost two thirds of the cases the abortion was "accidental." Once each diarrhea, septicemia, pneumonia, nephritic toxemia, riding over rough roads, and a fall from a horse are mentioned as associated factors. In 2 cases premature separation of the placenta seems to have been the cause of the accident, and in 2 others syphilis is mentioned.

TABLE 3.—*Causes of 68 stillbirths in 1,815 deliveries of hospitalized American Indians*

Cause	Percent	Cause	Percent
Complications of labor	17.6	Toxemia	2.9
Prematurity	11.8	Other maternal diseases	2.9
Syphilis	10.3	Placental causes	2.9
Deformity	5.9	Various	8.8
Traumatism	4.4	Unknown	32.4

Even in the case of the 68 stillbirths the cause of death is unknown in 32.4 percent of the cases—almost one third of the total. This is a rather large percentage even for nonautopsy cases. It is possible that it reflects the conservatism of the hospital physicians who hesitate, in doubtful cases, to make a positive diagnosis where it is not possible to obtain autopsies.

It is interesting to compare the data in table 3 with the autopsy findings of such able investigators as Eardly Holland in England and Williams in this country.[3] In their studies, as in the present one, the complications of labor and syphilis stand out as prominent causes of stillbirth. In post mortem findings prematurity naturally loses much of its importance, because frequently an autopsy will reveal the real cause of the premature birth. In the present study almost 40 percent of the stillbirths were ascribed to these three causes—complications of labor, prematurity, and syphilis.

THE AGE DISTRIBUTION AND DEGREE OF BLOOD OF THE MOTHERS IN CASES OF PREGNANCY FAILURE

The racial purity and age distribution of the mothers who aborted or produced still-born children are shown in table 4.

[3] The Problem of Fetal and Neonatal Death. By E. Blanche Sterling. Public Health Reports, Mar. 18, 1927. (Reprint No. 1146.)

TABLE 4.—*Age distribution and degree of blood of mother in 195 cases of abortion and stillbirth*

Age	Full blood		Mixed blood		Total
	Abortion	Stillbirth	Abortion	Stillbirth	
Under 15		1	2		3
15 to 19	8	6	10	5	29
20 to 24	15	5	6	14	40
25 to 29	14	10	15	4	43
30 to 34	17	6	12	3	38
35 to 39	8	2	11	4	25
40 and over	3	6	5	1	15
Unknown		1	1		2
Total	65	37	62	31	195

When all ages are considered, it is seen that there were almost 10 percent more failures in the pregnancies of the full-blood women than in those of mixed blood.

When these pregnancy failures are made specific for age and degree of blood, as in table 5, the differences between the full- and mixed-blood groups are brought out in detail. Since there were only 4 mothers under 15 years of age, they have been added to the 15 to 19 group.

TABLE 5.—*Percentages of pregnancies of Indian women which resulted in abortion or stillbirth, by age and degree of blood*

Age	Number of pregnancies		Number of abortions and stillbirths		Percentage of abortions and stillbirths	
	Full blood	Mixed blood	Full blood	Mixed blood	Full blood	Mixed blood
19 and under	117	150	15	17	12.82	11.33
20 to 24	272	302	20	20	7.35	6.62
25 to 29	205	199	24	19	11.71	9.55
30 to 34	146	144	23	15	15.75	10.42
35 to 39	94	75	10	15	10.64	20.00
40 and over	47	49	9	6	19.15	12.24
All ages	889	923	102	93	11.47	10.08

The distribution of the abortions and stillbirths in the various age groups is about what one would expect, with the exception of the apparently erratic figures in the 35 to 39 group.

The figures of all of the groups, with the exception noted, if taken at their face value, would seem to indicate that abortions and stillbirths were relatively more common in full-blood than in mixed-blood women. This is so opposed to the general opinion that childbearing is a more normal function in more primitive races that a critical study of the figures seemed necessary.

Since the age distribution of the full- and mixed-blood women are quite similar, the data for all ages were used. The percentage of abortion and stillbirth among the full-blood women was 11.5; among

the mixed-blood it was 10.1. The probable error was calculated for each of these rates, and the probable error of the difference. The difference between the rates is 1.39, with a probable error of 0.98 (1.39 ±0.98). Since the difference is less than 1½ times its probable error, what at first sight appeared to forecast a reversal of our previous views apparently may be only a matter of chance.

As we have no reason to believe there is any difference in the tendency to abortion and stillbirth between the full- and mixed-blood women, the whole group may be compared to the white group studied by Sydenstricker. Pregnancy failures in the two groups according to age of the mother will be compared.

Sydenstricker's percentages by age of the mother are very irregular in the d fferent age groups. This is probably due to the small numbers in each group. To lessen this disadvantage, his age groups are combined into 10-year periods, and the present study is treated likewise in order to make the groups comparable.

TABLE 6.—*Percentages of total pregnancies resulting in abortion or stillbirth, by age of mother*

Age	Total number of pregnancies		Number of abortions and stillbirths		Percent that were abortions and stillbirths	
	Indian women	Hagerstown women	Indian women	Hagerstown women	Indian women	Hagerstown women
19 and under	268	28	32	----------	11 94	----------
20 to 29	979	174	83	17	8 48	9 77
30 to 39	460	125	63	10	13 70	8 00
40 and over	96	17	15	4	15 62	23 53
All ages	1,803	344	193	31	10 70	9 01

The Indian group under 19 includes 4 mothers under 15 in whom an abortion (twins) and 1 stillbirth occurred. This causes an increase in the rate of about 1 percent. In the Hagerstown women the small number in the oldest age group causes its high abortion and stillbirth rate to be unreliable. Altogether the rates by age groups among the Indian women give a more "normal" picture—high among the very young mothers, lowest in the 20 to 29 age group, and gradually rising with advancing age. When all ages are considered, the rates for the Indian and Hagerstown women are not very different. The Hagerstown data include both hospital and home deliveries.

NEONATAL DEATH

An Indian hospital population is hard to control in the matter of length of hospital residence. A frequent notation on a patient's record is "Left against the doctor's advice." Consequently, it has

been impossible to study the subject of infant deaths among these hospital patients for a longer period than 1 week. If a period covering 14 days be adopted for a consideration of neonatal death, it is found that only 231 (14.2 percent of the total number of live births) of the babies born alive stayed in the hospital that long. When a 7-day period is selected we have a group of 1,429 women who gave birth to live babies and who stayed in the hospital a week after delivery, or whose baby died before the end of the week. This is almost 88 percent of the total number of live births. A 7-day period is not unsatisfactory for a consideration of neonatal death, because in all studies it is found that a majority of these deaths occur in the first week of life.

Of these 1,429 infants born alive, 38 died in the first week of life. Another infant may have fallen into this class, but since its exact age at death could not be determined, it was not included. Twenty-two full-blood and sixteen mixed-blood women lost their babies in the first week. In two instances the mother died. Sixteen of the neonatal deaths occurred in the first day.

The infant death rate in the first week in this group was 26.6 per thousand live births. This is lower than the rate reported by the Bureau of the Census for the birth registration area in continental United States in 1929, which was 31.9 per thousand live births.

One must remember that continental United States contains a population varying widely in racial stock, economic conditions, and social status, and the care given at childbirth varies widely with these factors. The group under consideration is more or less homogeneous, and all received hospital care. In this study the Indian Service hospitals have shown a lower neonatal rate—by almost 20 percent—considering only the first week of life, than the country as a whole.

CAUSES OF NEONATAL DEATH

The most frequent condition associated with the infant's death in the first week is prematurity. This is mentioned alone in 10 cases. In two others it is associated once with atelectasis and once with convulsions. In the latter case it is noted that the mother had nephritis. Atelectasis alone is given as a cause in two cases.

The second largest group of deaths was associated with hemorrhage. There were 2 cases of cerebral hemorrhage and 1 case of the meninges, 2 cases of the intestinal tract, 1 case of the umbilical cord associated with icterus neonatorum, and 1 unspecified.

There were 4 cases associated with syphilis and 2 of icterus neonatorum alone. Pneumonia in the mother, injury at birth, mucous colitis, hemophilia, status lymphaticus, "cardiac trouble," and heat prostration are mentioned in explanation of one case each. It is more

than likely that the cases of hemorrhage of the brain and meninges are simply cases of birth injury.

In four cases no attempt is made to assign a cause.

SUMMARY

The basis of the study is a group of 1,815 pregnancies occurring in Indian women whose deliveries took place in Indian Service hospitals.

In this particular group there was an approximately equal division between full- and mixed-blood Indians—889 of full blood and 923 of mixed blood. In the Indian population as a whole it appears that full-blood Indians do not seek hospitalization as frequently as do those of mixed blood.

A large proportion of the deliveries were normal. Twelve cases of multiple births occurred. This is rather a low rate, but may have no racial significance, because of the size of the group.

The real prevalence of venereal disease could not be determined because the Wassermann or Kahn tests were not routine procedures in all hospitals.

The maternal mortality rate compared favorably with that of the country as a whole, but it must be remembered that the latter rate covered a longer period than some of these cases could be followed. This is of interest in view of the fact that frequently hospital maternal mortality is higher than the average rate, though this is not always the case.

No maternal deaths followed abortion. This fact suggests that if all women aborting could have hospital care, abortion as a factor in maternal mortality would lose much of its present significance.

The puerperal death rate from septicemia was lower than that for the registration area in continental United States in 1929. It does not seem likely that a longer period of observation would have equalized these rates.

There were 195 pregnancy failures, 127 being abortions and 68 stillbirths. These failures comprised 10.7 percent of the total number of pregnancies, approximating the percentage (9.0) noted by Sydenstricker in the Hagerstown group of white women. In a large majority of the cases no definite cause could be assigned. It is interesting to note, however, that in the cases of stillbirth, complications of labor and syphilis stand out as prominent causes, in agreement with the autopsy findings of leading investigators in this country and in England. The stillbirth rate per 1,000 live births was 38.7.

A critical statistical analysis of the data indicates that pregnancy failure has probably little or no relation to the degree of blood of these Indian women.

The neonatal death rate could be calculated only for the first week of life because the number remaining in the hospital throughout the

second week was too small to have any statistical significance. The death rate in the first week was lower than the rate reported by the Bureau of the Census for the birth registration area in continental United States in 1929. Prematurity is given as the greatest single cause of neonatal death. If it had been possible to obtain autopsy data, the diagnosis of prematurity would probably have been altered in a number of the cases.

RAT HARBORAGE AND ITS RELATION TO THE SPREAD OF BUBONIC PLAGUE

By B. E. Holsendorf, *Chief Pharmacist, United States Public Health Service*

The important rôle which rat harborage plays in favoring the propagation of rat life on board ships has been described in The Rat Proofing of Vessels (Third Edition), issued by the United States Public Health Service.[1] This article pointed out that colony rat life persisted because of the presence of available harborage. Experience has demonstrated that the elimination of rat harborage definitely controls rodent life on ships and reduces it to a minimum.

It has been found also that harborage is not only responsible for the persistence of rat infestation, but its existence is one of the chief causes of the high flea index found on rats. Eskey (1) found that "Buildings offering the greatest rat harborage within them have the highest *cheopis* index, it being 7.37 for 45 class B buildings, 8.79 for 62 class C buildings, and 5.24 for 71 class D buildings." He also states that "the *cheopis* index will be proportional to the number of rats when they are harboring inside buildings which offer suitable places for flea reproduction."

Eskey found further, one year later in Peru (2), that "The *X. cheopis* index was greater for rats caught in buildings or closely associated with buildings, in fields of cotton, sugarcane and corn, and untreated garbage dumps. The infestation of the rats caught in the places named above was great enough to account for the spread of plague among them. * * * It appears probable that protected nesting places of rats in buildings, in untreated garbage dumps, and probably aboveground nests in fields, are necessary for the existence and multiplication of *X. cheopis* and that even in the climate of Lima, which is drier and more moderate than in most parts of the world, this species can not persist among sewer rats and rats living in underground burrows. The greatest incidence of plague per thousand population in towns and cities in Peru occurred in the communities in which the rat harborage of buildings was greatest regardless of the climatic location of the towns within or outside the zone most favorable to the existence of the chief transmitting agent, *X. cheopis*."

[1] Supplement No 93 to the Public Health Reports (1930).

Conversely, Eskey (1) discovered in Ecuador that "Rats harboring outside of buildings in Guayaquil have a *cheopis* index too small to cause epidemic of plague among them." In the summary of the report of his work in Peru (2) he makes the following corroborative statement:

It is doubtful whether the low incidence or even complete absence of human plague due to relative rat-proof construction of buildings could be better illustrated than by the findings in central and southern Peru. It is desired to emphasize that in most parts of the world where *X. cheopis* is the transmitting agent, plague could never exist in epidemic form if the buildings were so constructed and maintained that the rat population within them was reduced to a minimum.

The same author (1) stated further that—

The nature of the harboring place of rats is a more important factor in determining the number of *cheopis* than the character of the place in which they are caught. If the theory advanced above is correct, then one can say that the value of the rat proofing of buildings not only depends on the fact that it prevents inside harborage, but also that rats which may invade this type of building in search of food will be unlikely to carry plague because of the few fleas with which they are infested.

Since the nature of the harboring place used by rats is a more important factor in determining the *number* of *cheopis* fleas than the character of the place in which they are caught, and, as the data submitted in the reports referred to above have shown very conclusively that without proper harborage rats have a *cheopis* index too low for the continued transmission of plague, the necessity for the elimination of harborage *transcends everything else* as an effective measure for the prevention of the spread of bubonic plague.

Experience has demonstrated that the removal or protection of rat harborage has definitely controlled rodent life on ships and reduced it to a minimum, but the important rôle that such elimination—or the absence of suitable rat harborage—has played in lowering the *cheopis* index had not been stressed until pointed out in Eskey's reports.

Assuming that the findings are correct, the existence of well-protected harborage is more of a potential agent for the dissemination of bubonic plague than the presence of actual rat life where little or no harborage exists. In other words, as shown by the report, buildings offering the greatest rat harborage within them had the highest *cheopis* index, and, conversely, rats living outside of buildings or in those possessing practically no inside harborage had the lowest *cheopis* index, which, in several instances, was less than 1 percent, even when a number of rats were trapped (1).[2]

[2] The following is taken from pp. 2106–2107: "*Cheopis index of rats living under and outside of buildings.*—In all, 81 rats were caught in places outside of buildings, such as gardens, wharves, lumber yards, etc., and found to have a total *cheopis* index of only 0.28. Many of these rats were caught during the months when the total index was at its highest level. Furthermore, an inspection was made of a saloon, a hospital, and a hotel in which 153 rats were caught and found to have the low indices of 0.76, 1.80, and 1.31, respectively. Most of these rats were caught during November and December, when the general index was high. The inspection showed that most of the rats obtained from the above sources were invaders from outside the building."

This contrast in the *cheopis* index of rats occupying harborage and those that were living under conditions that offered practically no permanent or secure harborage is very significent and calls attention to the *margin of safety* that is made possible by its elimination and the resultant automatic reduction in the number of fleas on rats living in places where harborage is nonexistent. This knowledge is practically the key to the solution of the problem. The importance of the elimination or protection of harborage so that it cannot be used becomes a paramount necessity, if the flea index is to be kept to the level where transmission is not possible.

The rat proofing of ships, will, therefore, become a valuable aid in making possible and maintaining this low flea index, thus reducing the danger of the propagation and spread of plague.

Because of the rôle which harborage plays, it becomes increasingly important to recognize it in its many phases and to become familiar with the methods used to eliminate or protect it.

Broadly speaking, rat harborage is divided into three general classes: (*a*) Structural; (*b*) Incidental; and (*c*) Temporary. Examples of each may be cited as follows:

(*a*) Double walls, deckhead ceilings, elevated floors in living quarters, spaces filled with insulating material in refrigerators and refrigerating compartments, pipe casings of various kinds, ceiling or wooden flooring over tank tops at bottom of holds, and close-fitting wooden screen bulkheads.

(*b*) Various types of furniture and fixtures.

(*c*) Dunnage, supplies, stores, cargo, old parts of machinery, portable type of steerage gear, trash, etc.

It is more desirable and advantageous to accomplish rat proofing by *eliminating* enclosed spaces than by protecting them. If the method of elimination is employed, the harborage is removed permanently and becomes nonexistent; the sanitary risk is reduced automatically to a minimum. Effective rat proofing also will result if the protective method is used. In such a case, however, the harborage still exists as a potential risk, and the protection must be kept intact and in good repair to prevent its reuse for nesting and breeding.

Methods describing in detail the technique recommended for the elimination of the various types of harborage or its protection are given in the publication, The Rat Proofing of Vessels, issued by the United States Public Health Service. (Supplement No. 93.)

Since the standard form of international deratization or deratization-exemption certificate in general use under the provisions of article 28 of the International Sanitary Convention of 1926 provides for the recording of the physical condition of each compartment of a vessel as to the existence of rat harborage, and the extent of its correction

or elimination, it is essential that the recording of this data be *standardized* and that it present a *graphic word picture of existing harborage conditions.* Particularly is this necessary in view of its bearing on the *flea index,* which determines the degree of the risk or danger of transmission of plague.

As examples of such standardization, it is suggested that if harborage has been entirely eradicated by the elimination of the enclosed space, such as by the installation of open-type pipe casings, absence of wooden floors or ceilings in lower holds, sheathings or panels on shell sides, etc., the entry on the certificate under the heading "Rat Harborage" should show "None," and under caption "Corrected" the entry should be "Yes—eliminated." Such data will not only record the facts, but will serve as a valuable guide to the quarantine inspector at other ports who may desire to check up on conditions. If harborage has been eliminated structurally, the inspector has to concern himself only with the incidental harborage in cargo, dunnage, etc. If harborage has been rat proofed by the protective method, and the certificate records this fact, the inspection should include an examination of such sections to ascertain whether the work is intact and in good repair. If no differentiation is made on the standard certificate, this valuable information will be lacking and the inspector will have nothing to show him whether harborage has been eliminated or is protected.

Protected harborage should be recorded on the certificate under the column "Rat harborage" as "Moderate—inactive" or "Pronounced—inactive," according to its extent, and the entry under "Corrected" should be "Yes—protected." The existence of temporary harborage in any compartment should be recorded on the certificate and a recommendation for its removal or protection made on the certificate at the time of issue. Temporary harborage, such as old parts of gear, portable steerage equipment stored in between deck spaces, and excessive quantities of dunnage, have been used to a considerable extent by rats for nesting and breeding purposes.

With the adoption of such a standard system of recording the conditions existing on vessels inspected, the terms used will convey a common idea or meaning, and show to a considerable extent what the actual status of a vessel is as regards harborage.

REFERENCES

(1) Pub. Health Repts., vol. 45, no. 36, September 5, 1930.
(2) Id., vol. 47, no. 47, November 18, 1932.

DEATHS DURING WEEK ENDED APRIL 29, 1933

[From the Weekly Health Index issued by the Bureau of the Census, Department of Commerce]

	Week ended Apr. 29, 1933	Corresponding week, 1932
Data from 85 large cities of the United States:		
Total deaths	8,055	8,139
Deaths per 1,000 population, annual basis	11.3	11.6
Deaths under 1 year of age	641	637
Deaths under 1 year of age per 1,000 estimated live births [1]	56	53
Deaths per 1,000 population, annual basis, first 17 weeks of year	12.0	12.5
Data from industrial insurance companies.		
Policies in force	68,497,693	73,510,439
Number of death claims	13,191	11,576
Death claims per 1,000 policies in force, annual rate	10.0	10.4
Death claims per 1,000 policies, first 17 weeks of year, annual rate	10.9	10.6

[1] 1933, 81 cities; 1932, 80 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended May 6, 1933, and May 7, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended May 6, 1933, and May 7, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended May 6, 1933	Week ended May 7, 1932	Week ended May 6, 1933	Week ended May 7, 1932	Week ended May 6, 1933	Week ended May 7, 1932	Week ended May 6, 1933	Week ended May 7, 1932
New England States:								
Maine	2	3	28	44	6	290	1	0
New Hampshire					6	7	0	1
Vermont					32	190	0	0
Massachusetts	15	23	2	5	460	949	3	2
Rhode Island		5			2	92	1	0
Connecticut	1	3	4	20	274	231	0	0
Middle Atlantic States:								
New York	63	98	[1] 26	[1] 16	2,820	2,415	2	6
New Jersey	21	25	4	14	952	833	0	3
Pennsylvania	48	69			1,403	1,871	2	2
East North Central States:								
Ohio	30	17	9	12	652	1,555	0	1
Indiana	13	32	33	36	316	128	0	3
Illinois	26	65	23	47	842	1,318	10	10
Michigan	12	12	2	9	915	2,441	6	9
Wisconsin	5	7	43	48	416	2,310	0	2
West North Central States:								
Minnesota	2	4	1	2	903	38	1	1
Iowa	11	12			63	4	1	1
Missouri	20	24	1	6	184	110	3	1
North Dakota		6			88	40	3	0
South Dakota	2	5			37	6	0	1
Nebraska	2	15			117	3	0	0
Kansas	7	11	4	4	407	380	0	0
South Atlantic States:								
Delaware	1	1			4	1	0	0
Maryland [2]	7	15	7	14	32	69	1	0
District of Columbia	4	11		2	16	19	0	1
Virginia	9				214		3	
West Virginia	5	7	7	50	84	301	1	0
North Carolina [3]	19	4	13	291	696	869	0	3
South Carolina	14	3	247	892	499	132	0	4
Georgia [3]	5	8			106	57	0	2
Florida	3	5	2	2	94	8	0	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended May 6, 1933, and May 7, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended May 6, 1933	Week ended May 7, 1932	Week ended May 6, 1933	Week ended May 7, 1932	Week ended May 6, 1933	Week ended May 7, 1932	Week ended May 6, 1933	Week ended May 7, 1932
East South Central States:								
Kentucky	5	13	22	110	114	115	0	0
Tennessee	11	8	50	111	110	42	2	1
Alabama [3]	6	15	34	68	114	9	0	1
Mississippi	6	5	---	---	---	---	0	0
West South Central States:								
Arkansas	8	2	11	45	200	---	0	1
Louisiana	8	16	7	13	33	91	1	0
Oklahoma [4]	4	18	25	64	166	95	4	2
Texas [3]	19	47	91	63	1,388	552	2	1
Mountain States:								
Montana [5]	---	---	8	---	38	100	1	1
Idaho [5]	---	---	3	---	31	---	0	0
Wyoming [5]	---	1	---	---	8	44	1	0
Colorado	1	9	27	---	3	124	0	0
New Mexico	6	5	20	---	8	35	0	0
Arizona	2	---	---	3	92	2	0	1
Utah	---	---	---	---	6	---	0	0
Pacific States:								
Washington	4	3	38	1	96	309	1	1
Oregon [5]	2	3	24	42	75	269	1	1
California [6]	26	67	20	65	1,329	696	1	10
Total	485	702	836	2,099	16,460	19,150	52	73

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended May 6, 1933	Week ended May 7, 1932	Week ended May 6, 1933	Week ended May 7, 1932	Week ended May 6, 1933	Week ended May 7, 1932	Week ended May 6, 1933	Week ended May 7, 1932
New England States:								
Maine	0	1	17	20	0	0	2	2
New Hampshire	0	0	17	9	0	0	1	0
Vermont	0	0	10	4	0	1	0	0
Massachusetts	1	1	377	465	0	0	0	0
Rhode Island	0	0	33	52	0	0	0	1
Connecticut	0	0	106	106	0	0	3	0
Middle Atlantic States:								
New York	2	1	758	1,603	2	3	12	15
New Jersey	0	0	276	337	0	0	4	1
Pennsylvania	5	0	875	724	0	0	7	6
East North Central States:								
Ohio	2	1	557	269	0	12	7	5
Indiana	3	0	136	199	1	9	5	3
Illinois	0	0	369	312	7	6	11	7
Michigan	3	2	420	422	0	10	4	2
Wisconsin	0	1	145	63	0	0	1	9
West North Central States:								
Minnesota	0	0	101	97	0	4	1	1
Iowa	0	0	28	41	19	17	0	2
Missouri	0	0	84	52	0	6	1	3
North Dakota	0	0	18	8	0	0	1	0
South Dakota	0	0	18	4	0	0	0	0
Nebraska	0	0	14	15	1	20	0	0
Kansas	1	0	25	54	1	10	2	3
South Atlantic States:								
Delaware	0	0	14	10	0	0	0	0
Maryland [1]	0	0	123	113	0	0	1	1
District of Columbia	0	1	14	27	0	0	0	1
Virginia	2	---	34	---	0	---	10	---
West Virginia	0	0	21	18	2	1	6	6
North Carolina [3]	1	1	56	30	7	2	4	4
South Carolina	0	0	3	4	0	1	6	7
Georgia [3]	0	1	4	10	0	3	9	17
Florida	0	0	3	1	0	11	1	6

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended May 6, 1933, and May 7, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended May 6, 1933	Week ended May 7, 1932	Week ended May 6, 1933	Week ended May 7, 1932	Week ended May 6, 1933	Week ended May 7, 1932	Week ended May 6, 1933	Week ended May 7, 1932
East South Central States:								
Kentucky	0	0	68	80	0	4	8	4
Tennessee	1	1	40	27	2	20	4	4
Alabama [3]	0	0	10	6	0	19	1	6
Mississippi	0	0	9	13	2	20	8	6
West South Central States:								
Arkansas	0	1	3	4	6	9	2	3
Louisiana	0	2	10	10	0	8	8	19
Oklahoma [4]	0	0	7	26	1	23	1	3
Texas [3]	2	1	57	46	17	37	12	4
Mountain States:								
Montana [5]	0	0	10	17	2	2	1	1
Idaho [5]	0	0	6	2	6	2	0	0
Wyoming [5]	0	0	9	3	0	1	3	0
Colorado	0	0	33	34	3	1	0	1
New Mexico	0	0	10	15	1	0	2	0
Arizona	0	0	7	5	1	0	0	0
Utah	0	0	6	1	0	0	0	0
Pacific States:								
Washington	1	0	55	32	5	13	0	0
Oregon [5]	1	0	24	6	10	10	1	0
California [5]	1	2	141	162	32	21	6	6
Total	26	17	5,161	5,558	128	306	156	159

[1] New York City only.
[2] Week ended Friday.
[3] Typhus fever, week ended May 6, 1933, 13 cases: 1 case in North Carolina, 3 cases in Georgia, 6 cases in Alabama, and 3 cases in Texas.
[4] Figures for 1933 are exclusive of Oklahoma City and Tulsa and for 1932 are exclusive of Tulsa only.
[5] Rocky Mountain spotted fever, week ended May 6, 1933, 15 cases: 3 cases in Montana, 1 case in Idaho, 5 cases in Wyoming, 3 cases in Oregon, and 3 cases in California.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week:

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
March 1933										
Delaware		12			30		0	55	0	1
Mississippi	3	22	3,782	1,450	2,389	297	1	29	1	37
April 1933										
Connecticut	1	23	41		1,077		0	578	12	3
Delaware	1	12	3		23		0	60	0	1
District of Columbia	3	17	6		34	1	0	57	0	
Maine	1	2	107		15		0	120	0	7
Massachusetts	6	85	11		1,974		0	1,646	0	12
Nebraska	9	34	50		133		0	134	7	7
Vermont		2			141		0	47		

March 1933

	Cases
Anthrax:	
Delaware	1
Chicken pox:	
Delaware	47
Mississippi	429
Dengue:	
Mississippi	17
Dysentery:	
Mississippi (amebic)	52
German measles:	
Delaware	1
Hookworm disease:	
Mississippi	389
Mumps:	
Delaware	9
Mississippi	298
Ophthalmia neonatorum:	
Mississippi	15
Puerperal septicemia:	
Mississippi	26
Rabies in animals:	
Delaware	3
Mississippi	3
Trachoma:	
Mississippi	1
Undulant fever:	
Mississippi	1
Whooping cough:	
Delaware	2
Mississippi	982

April 1933

	Cases
Actinomycosis:	
Massachusetts	1
Chicken pox:	
Connecticut	667
Delaware	46
District of Columbia	146
Maine	202
Massachusetts	1, 209
Nebraska	188
Vermont	95
Conjunctivitis:	
Connecticut	1
Maine	1
Dysentery:	
Massachusetts	5
German measles:	
Connecticut	25
Maine	54
Massachusetts	92
Lethargic encephalitis:	
Connecticut	1
District of Columbia	1
Maine	1
Mumps:	
Connecticut	410
Delaware	3
Maine	124
Massachusetts	786
Nebraska	175
Vermont	202

	Cases
Ophthalmia neonatorum:	
Maine	1
Massachusetts	152
Paratyphoid fever:	
Connecticut	2
Maine	1
Massachusetts	1
Rabies in animals:	
Connecticut	8
Delaware	1
Maine	17
Septic sore throat:	
Connecticut	7
Maine	1
Massachusetts	15
Tetanus:	
Connecticut	2
Trachoma	
Massachusetts	5
Trichinosis	
Connecticut	1
Massachusetts	1
Undulant fever	
Connecticut	2
Massachusetts	2
Vincent's angina:	
Maine	2
Whooping cough:	
Connecticut	416
Delaware	5
District of Columbia	22
Maine	70
Massachusetts	840
Nebraska	85
Vermont	79

WEEKLY REPORTS FROM CITIES

City reports for week ended April 29, 1933

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	0		0	0	1	3	0	1	0	2	21
New Hampshire:											
Concord	0		0	0	2	0	0	0	0	0	8
Manchester	0		0	0	1	1	0	1	0	0	9
Nashua	0		0	0	0	0	0	0	0	0	
Vermont:											
Barre	0		0	0	0	0	0	1	0	9	5
Burlington	0		0	1	0	2	0	0	0	0	8
Massachusetts:											
Boston	5	1	2	264	8	72	0	8	0	41	221
Fall River	0		0	2	1	5	0	0	0	13	28
Springfield	1		0	2	1	17	0	1	0	15	40
Worcester	1	4	0	45	3	25	0	3	0	26	43
Rhode Island:											
Pawtucket	0		0	0	0	0	0	0	0	0	18
Providence	1		1	0	5	20	0	2	1	10	68
Connecticut:											
Bridgeport	0		0	40	1	14	0	1	1	2	29
Hartford	0		0	20	2	27	0	0	0	6	32
New Haven	0	1	0	8	2	5	0	0	0	15	49
New York:											
Buffalo	1		1	55	17	55	0	2	0	34	131
New York	48	15	10	2, 262	141	307	0	89	7	146	1, 500
Rochester	0		0	1	4	9	0	1	0	15	70
Syracuse	1		1	0	3	14	0	1	0	2	54
New Jersey:											
Camden	2		0	19	2	10	0	0	0	0	20
Newark	0	1	1	429	4	28	0	6	0	26	109
Trenton	0		0	17	3	6	0	2	0	2	34
Pennsylvania:											
Philadelphia	4	8	5	328	34	120	0	23	2	7	451
Pittsburgh	1	3	2	10	18	91	0	3	1	40	146
Reading	0		0	40	1	11	0	2	0	5	26
Scranton	0			3		19	0		0	0	

City reports for week ended April 29, 1933—Continued

State and city	Meningococcus meningitis		Polio-myelitis cases	State and city	Meningococcus meningitis		Polio-myelitis cases
	Cases	Deaths			Cases	Deaths	
New York:				Minnesota:			
Buffalo	0	1	0	St. Paul	1	0	0
New York	0	3	0	Iowa:			
New Jersey:				Waterloo	0	1	0
Newark	1	0	0	Missouri:			
Pennsylvania:				Kansas City	0	1	0
Philadelphia	0	1	0	St. Louis	3	0	0
Pittsburgh	1	0	0	Nebraska:			
				Omaha	0	1	0
Ohio:							
Cincinnati	0	0	1	Georgia:			
Cleveland	0	0	1	Atlanta	1	1	0
Indiana:							
Fort Wayne	1	1	0	Texas:			
Indianapolis	2	0	0	Dallas	0	1	0
Illinois:							
Chicago	13	4	0	Oregon:			
Michigan:				Portland	0	0	1
Detroit	1	0	2				
Wisconsin:							
Milwaukee	1	0	0				

Lethargic encephalitis.—Cases: Boston, 1; Bridgeport, 1; New York, 2; Pittsburgh, 1; Cleveland, 1; Chicago, 1.

Pellagra.—Cases: Winston-Salem, 1; Charleston, S.C., 3; Birmingham, 2; San Antonio, 1; Los Angeles, 2.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—2 weeks ended April 22, 1933.—The Department of Pensions and National Health of Canada reports cases of certain communicable diseases for the 2 weeks ended April 22, 1933, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis			1	3	1	1	1	2		9
Chicken pox		25		488	477	46	31	6	129	1, 202
Diphtheria		3	1	42	20	7	2		3	78
Dysentery					1				1	2
Erysipelas				21	11		2	1	1	36
Influenza		1	8	12	12				12	45
Lethargic encephalitis					1					1
Measles	22	9	5	387	357	10	5	15	29	839
Mumps		5			394	60	7		36	502
Paratyphoid fever					6					6
Pneumonia			2		18		2		10	32
Poliomyelitis				4	1					5
Scarlet fever		8	12	132	169	52	36	11	5	425
Trachoma							2		6	8
Tuberculosis	2	10	13	99	75	22	17	6	53	297
Typhoid fever		6		19	19			3	4	51
Undulant fever					9					9
Whooping cough		1		106	216	37	9	3	24	396

IRISH FREE STATE

Vital statistics—Year 1932.—The following statistics for the year 1932 have been published by the Registrar-General for the Irish Free State. The figures are provisional:

Population (estimated)	2, 974, 000
Number of births	56, 167
Birth rate per 1,000 population	18. 9
Number of deaths	42, 957
Death rate per 1,000 population	14. 4
Infant mortality rate per 1,000 births	71

The number of deaths from certain diseases, together with the death rates per 1,000 population, reported in the Irish Free State during the year 1932 are shown in the following table;

Disease	Number of deaths	Death rate per 1,000 population	Disease	Number of deaths	Death rate per 1,000 population
Cancer	3, 175	1. 07	Puerperal conditions	235	[1] 4. 18
Diarrhea and enteritis (under 2 years)	551		Scarlet fever	86	. 03
Diphtheria	377	. 13	Tuberculosis, pulmonary	2, 798	. 94
Dysentery	3		Tuberculosis, all forms	3, 579	1. 20
Influenza	1, 595	. 54	Typhoid fever	83	. 03
Measles	247	. 08	Typhus fever	8	
			Whooping cough	294	. 10

[1] Rate per 1,000 births

ITALY

Communicable diseases—Four weeks ended December 11, 1932.—During the four weeks ended December 11, 1932, cases of certain communicable diseases were reported in Italy as follows:

Disease	Nov 14-20		Nov 21-27		Nov 28-Dec 4		Dec. 5-11	
	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected
Anthrax	28	26	18	16	36	33	15	13
Cerebrospinal meningitis	10	9	17	12	7	7	3	3
Chicken pox	106	67	134	73	216	86	227	102
Diphtheria and croup	810	399	899	386	969	407	809	384
Dysentery	15	13	15	12	12	8	4	4
Lethargic encephalitis	3	2	4	4	2	2	1	1
Measles	883	132	1,178	161	1,065	168	1,032	182
Poliomyelitis	26	22	15	14	14	11	11	9
Scarlet fever	563	206	618	193	594	185	414	157
Typhoid fever	981	474	783	353	777	398	726	332

JAMAICA

Communicable diseases—Four weeks ended February 25, 1933.—During the 4 weeks ended February 25, 1933, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island of Jamaica, outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis		1	Puerperal fever		4
Chicken pox	1	9	Scarlet fever		1
Diphtheria		1	Tuberculosis	32	76
Dysentery	3	6	Typhoid fever	10	51
Leprosy		2			

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

(NOTE —A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for Apr 28, 1933, pp 459-470 A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued May 26, 1933, and thereafter, at least for the time being, in the issue published on the last Friday of each month)

Cholera

Philippine Islands.—During the week ended May 6, 1933, 9 cases of cholera with 8 deaths were reported at Ormoc, Leyte Province, Philippine Islands; 1 case at Pasay, Rizal Province; and 1 fatal case in the port of Iloilo.

Yellow Fever

Gold Coast—Keta.—On May 4, 1933, a case of yellow fever was reported at Keta, Gold Coast.

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UNITED STATES PUBLIC HEALTH SERVICE

HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst. Surg. Gen. R. C. WILLIAMS, *Chief of Division*

The PUBLIC HEALTH REPORTS are issued weekly by the United States Public Health Service through its Division of Sanitary Reports and Statistics, pursuant to acts of Congress approved February 15, 1893, and August 14, 1912.

They contain: (1) Current information of the prevalence and geographic distribution of preventable diseases in the United States in so far as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other communicable diseases throughout the world. (2) Articles relating to the cause, prevention, or control of disease. (3) Other pertinent information regarding sanitation and the conservation of the public health.

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PUBLIC HEALTH REPORTS

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PREPARATION OF A SCARLET FEVER STREPTOCOCCUS TOXOID AND ITS USE IN ACTIVE IMMUNIZATION

By M. V. VELDEE, *Surgeon, United States Public Health Service*

A sufficient number of investigators have demonstrated that the toxin produced by the hemolytic streptococcus of scarlet fever origin can be detoxified, at least in part, by the action of formalin and prolonged storage at 37° C., so that this procedure may be accepted as within the realm of possibility. However, there remain to be solved such problems as (*a*) the most practicable method of manufacture; (*b*) laboratory methods of titrating the antigenic value of this detoxified product; (*c*) the range of doses tolerated by susceptible individuals without undue reactions; and (*d*) the immunity response of susceptible individuals as indicated by the percentage who become Dick-negative subsequent to treatment. The study which is reported here was pursued in an effort to solve some of these problems and thereby to place the manufacture and use of scarlet fever toxoid on a practical basis.

PREPARATION OF THE TOXIN

Culture medium.—Because of the uniformly good growth and toxin production obtained with a modification of Douglas tryptic digest broth, this medium has been used exclusively throughout this study. The basic formula for the preparation of the pancreatic extract used in this broth is given by Cole and Onslow (1) and that for the broth by Watson and Wallace (2). Either beef or veal may be used. Instead of using 90 cc of concentrated hydrochloric acid to 7 kilograms of meat as directed, only 45 cc are added. The reaction is so adjusted before sterilization as to give a pH of 7.6 in the completed broth. Blood is not added.

Full-strength broth prepared in this manner contains between 300 and 400 mg of total nitrogen per 100 cc. This represents a food content probably far in excess of the requirements of the hemolytic streptococcus. Flasks containing 25, 50, 75, and 100 percent broth, respectively, were inoculated and incubated for 3 days. The toxin content of the four batches after incubation was the same as indicated by human skin tests. It is highly desirable to keep the protein content near the minimum consistent with maximum toxin production,

because of the possible connection between such foreign protein and reactions in the individual receiving the injection.

In the beginning of this study 75 percent Douglas broth was used, but toward the latter part this was changed to half-strength broth.

Culture.—In selecting a culture of hemolytic streptococcus suitable for toxin production one should make the selection on the basis of certain definite requirements; namely, (*a*) the toxin produced should be of a high titer, (*b*) the resulting toxin should be neutralizable by a known hemolytic streptococcus antitoxin of scarlet fever origin, and (*c*) the toxin when used as an antigen should stimulate the production of an antitoxin which, in turn, will neutralize the greatest possible range of hemolytic streptococcus toxins. If this wide neutralization range in an antitoxin cannot be obtained by the use of a single-strain antigen, the antigen from one or more additional strains should be added. However, probably nothing is accomplished by using a multiple-strain antigen for antitoxin production, provided the resulting antitoxins, when the antigens are used separately, neutralize within the same range.

The NY-5 strain has been used exclusively. Because of the hemolytic streptococcus strains available, this one more nearly meets the above criteria. The particular culture used has been carried in broth medium with transfers every second or third day and kept continuously at 37° C. since October 1929 without animal passage. Wheeler (3) states that of 500 strains studied the NY-5 strain proved of exceptionally broad valence and good toxin production. She selected 8 representative strains out of these 500 and observed their antigenic activities. No strain exceeded NY-5, and only one equaled it. Coburn and Pauli (4) report on 10 toxin-producing strains of hemolytic streptococci which had been isolated from patients suffering from rheumatic fever. The toxins derived from 6 of these 10 strains were neutralized by NY-5 antitoxin. Veldee (5) studied commercial antitoxins and found that those which had been prepared from an NY-5 containing antigen possessed greater neutralizing properties. Veldee and Dunnahoo (unpublished data) have observed that NY-5 antitoxin neutralizes toxins derived from hemolytic streptococci from erysipelas sources as readily as do erysipelas antitoxins.

In spite of this apparent superiority of the NY-5 strain over other known strains, the search for a more suitable strain or strains which will fill in where the NY-5 strain fails, should continue. However, when multiple strains are used for toxoid production, the toxins should be separately prepared and detoxified and later combined on the basis of individual antigenic value.

The inoculated broth is held at 37° C. for 72 hours for toxin production. Longer periods are objectionable because of the probability of unnecessarily increasing the amount of dissolved bacterial protein.

Practically all of the streptococcus growth takes place within the first 24 hours of incubation. Flasks A, B, and C of broth were each inoculated with the D-II strain of hemolytic streptococcus and placed at 37° C. After 24, 48, and 72 hours, respectively, the contents of each flask were filtered through a Berkefeld filter and then reinoculated with the same strain of streptococcus. A scarcely visible growth appeared in the 24-hour flask and none in the other two. Similar results were obtained with the NY-5 strain.

Correspondingly, all toxin production takes place within the first 24 hours. Eight hundred cubic centimeters of broth were inoculated with an NY-5 culture and incubated at 37° C. At the end of each successive 24-hour period thereafter 100 cc were removed from the flask and filtered. Subsequent skin tests on susceptible individuals showed no significant differences between the toxin content of the eight 100-cc batches thus obtained.

Concentration of the toxin.—The quantity of antigen in the form of toxoid which is tolerated by a susceptible individual is sufficiently large to make concentration highly desirable, if not essential. In a previous paper (*loc. cit.*) a method of concentrating the toxin was described which employed precipitation with acetone and acetic acid. The method represented a modification of a method described by Wadsworth and Quigley (6). It gave a highly purified toxin as measured by the small amount of total nitrogen in the finished product, but subsequent experience has shown that such a concentrate seems to lack stability and results in a very considerable loss of toxin. Further, such a highly purified product is not essential in the preparation of a toxoid.

Because of these objections, the concentration method used has been simplified to the following: Two volumes of acetone and one volume of toxin are cooled to 0° C. (If facilities are available, it is well to cool the acetone even further.) The toxin is added to the acetone and thoroughly mixed by rotating the flask vigorously for 3 to 5 minutes (violent shaking is not desirable), after which it is allowed to remain in the cold room until the flocculent precipitate has settled to the bottom (approximately one half to 1 hour). The precipitate is collected in a Buchner funnel by means of suction filtration. By placing a thin layer of paper pulp over the filter paper in the funnel the small holes do not become plugged and filtration proceeds rapidly. Suction is continued until all the acetone has been removed from the precipitate, after which the precipitate, paper pulp, and filter paper are placed in a volume of normal saline equivalent to one tenth the volume of the raw toxin used. Gentle stirring, so as to avoid foam, or allowing to stand in the cold room over night will cause the precipitate to redissolve. A second filtration through a Büchner funnel removes the paper pulp and filter paper. To this filtrate is added sufficient

full-strength broth so as to make the final volume one fifth the volume of the raw toxin used in the beginning. The reaction is adjusted to pH 7.4, and as a last step the concentrated toxin is filtered through a Berkefeld candle.

The end results obtained by this method of concentration are shown in table 1, where there is also a comparison with five lots of unconcentrated commercial toxins which were offered for purposes of active immunization by the Dick method. Those concentrates designated by the letters WA were prepared by precipitating both with acetone and acetic acid, whereas the two marked W were prepared by the method described above. The WA toxins have been concentrated 10 times by volume, as against 5 times concentration of the W toxins, yet each batch contains approximately the same total nitrogen and potency. The use of acetic acid removes more of the nitrogen-containing ingredients, but its use also causes a very great loss of toxin. With the use of a half-strength broth for toxin production, and by concentrating five times by volume with the acetone method, as was done with toxins HL-32W and HL-34W, a final product is obtained whose nitrogen content is no greater than unconcentrated toxin made from full-strength broth and whose potency is three and one half to four times that of a good unconcentrated toxin.

Little was known of the chemical nature of the toxin and of its behavior under various conditions, particularly if removed from its original broth environment. It was known that this toxin could be changed to toxoid by the action of formalin without the loss of much of its antigenic value when retained in the original toxin broth, and therefore, it seemed advisable to retain the concentrated toxin in a menstruum which would be very similar to the original broth. This reasoning has been fortified by the subsequent publication by Bunney (7) of his study on the action of formalin on diphtheria toxin in various stages of purification.

Experiments with detoxification of the toxin before concentration are under way. Should this procedure prove practicable, it would eliminate the need for re-solution in broth and thus reduce the total nitrogen content of the concentrated toxoid by one half as compared with the method just described.

PREPARATION OF THE TOXOID

Method of detoxification.—The practice has been to add 0.4 percent formalin to the concentrated toxin and store at 37° C. On the following day the reaction is adjusted to pH 7.2 by the addition of a solution of sodium carbonate. Skin tests for toxicity are made on the ears of susceptible white rabbits at the end of about 60 days. If considerable toxicity still remains, an additional 0.05 percent of formalin

is added and the pH is adjusted as stated above. The toxoid is allowed to remain in the warm room until tests indicate that the residual skin-reacting factor is not greater than 500 skin-test doses per cubic centimeter, which represents a reduction of more than 99.5 percent in the skin-reacting factor of a toxoid considered suitable for immunization purposes. (See tables 1, 2, and 3.) Table 2 indicates that this was accomplished in 56 to 88 days with toxoids Td-11, Td-12, Td-16, Td-20, and Td-21. The skin-reacting factor in Td-21 was reduced from approximately 175,000 STD per cubic centimeter to 500 in 66 days. Leaving it in storage for another 39 days only reduced the skin-reacting factor to 400 STD per cubic centimeter. Toxoid Td-14 still contained a residual of 1,500 STD after 82 days' storage. This lot contained a total of 526.5 mg of nitrogen per 100 cc (table 1), as against 190.4, 270 0, 323.7, and 323.7 and 317.4 mg, respectively, for the above toxoids. The rate of detoxification is influenced by the concentration of formalin and the total nitrogen content of the toxin. There appears to be an irreducible minimum of skin-reacting factor which cannot be detoxified. It is not entirely clear whether this is true toxin or some other substance.

TABLE 1.—*Total nitrogen and the estimated potency of certain concentrated scarlet fever toxins used for the manufacture of toxoid, as compared with the total nitrogen and potency of certain market samples of commercial toxins*

A. NATIONAL INSTITUTE OF HEALTH CONCENTRATED TOXINS

Designation of toxin	Concentration by volume	Total nitrogen expressed as milligrams per 100 cc	Estimated potency expressed as skin-test doses per cc
1930	Unconcentrated	326 0	50,000
HL23WA	2 times	190 4	75,000
HL25WA	10 times	270 0	200,000
HL26WA	10 times	374 3	200,000
HL27WA	10 times	526 5	200,000
HL32W	5 times	322 3	175,000
HL34W	5 times	317 4	175,000

B. COMMERCIAL UNCONCENTRATED TOXINS

Laboratory:			
A	Unconcentrated	347 6	45,000 STD
A	do	370 1	35,000 STD
D	do	394 6	60,000 STD
E	do	249 3	40,000 STD
F	do	446 6	50,000 STD

Heat stability of toxin and toxoid.—The original unconcentrated toxin which has been used in this study contained 45,000 STD per cubic centimeter. Subjecting this toxin to streaming steam in the Arnold

sterilizer (approximately 99° C.) for varying lengths of time caused the following reductions in the titer of the skin-reacting factor:

Period of exposure to streaming steam	Titer of the heated toxin in terms of skin test doses as compared with the reaction produced by 1 STD of standard control toxin	
	Less than—	At least as much as—
	STD per cc	*STD per cc*
Before heating	- --	15 000
30 minutes	25,000	10,000
60 minutes	10,000	5,000
120 minutes	5,000	2,000
180 minutes	1,000	100
240 minutes	100	10

From these data it would appear that the skin-reacting factor is heat labile within the limits described for this test and that the rate of destruction proceeds in an orderly manner.

A concentrated toxin (toxin HL-32W, which became toxoid Td-16 after detoxification) was similarly heated for 60 minutes. This reduced the skin-reacting factor from 175,000 STD to approximately 25,000 STD per cubic centimeter, which is an 85.7 percent reduction as compared with an approximate 88.9 percent reduction obtained with the unconcentrated toxin in the same length of time. Similar heating of the toxoid Td-16 reduced the residual skin-reacting factor from the equivalent of 500 STD in the unheated toxoid down to 125 STD, a reduction of 75 percent. The residual skin-reacting factor in the toxoid appears somewhat more resistant to prolonged heating than the raw toxin. The much greater concentration of heated toxoid which must be injected for the skin test may be a factor, and the presence of bacterial proteins must also be considered.

The question now naturally arises as to whether the skin-reacting factor at these various stages of heating is neutralizable with antitoxin, and, if so, how much antitoxin is required as compared with the neutralization of standard control toxin. The standard toxin and antitoxin provided by the National Institute of Health are so standardized that, on the average, one STD of toxin will be neutralized by 0.02 unit (one neutralizing skin-test dose) of antitoxin. The ratio is somewhat different when tested by the rabbit ear method. Neutralization tests with standard toxin and antitoxin on 128 suitable rabbits showed that 25 STD of toxin required on an average 0.081 unit (4.05 neutralizing skin-test doses), which means that antitoxin is 6.17 times more effective in neutralizing toxin by the rabbit ear method than in the human skin. Neutralization according to the same ratio takes place with the toxin concentrated by the acetone method.

Tests on rabbits indicate that the skin-reacting factor still present in unconcentrated toxin after heating in streaming steam for 60 minutes may be neutralized by antitoxin, the ratio of toxin to antitoxin being the same as with the unheated product.

The residual skin-reacting factor remaining in the toxoid after detoxification, as well as that residual remaining after heating the toxoid for 60 minutes in streaming steam, can also be neutralized with antitoxin. However, the quantity of antitoxin required was in each instance much greater than that needed for the neutralization of the skin-reacting factor present in the original untreated toxin. The greater concentration of reagents required for the neutralization tests with the residual in the toxoid may be a factor.

Attempts were made to demonstrate the combining power of the toxoid with antitoxin, but all tests ended in failure.

Antigenic tests on white rabbits.—A laboratory method for measuring the antigenic value of the toxoid has been developed which promises to be helpful. In an earlier paper (*loc. cit.*) the writer reported that most adult, white rabbits, as purchased in the open market by the National Institute of Health, when injected with one human skin-test dose of toxin intradermally on the under surface of the pinna of the ear develop an area of inflammation (visible only by transmitted light) very similar in size to the erythematous area produced by a similar intradermal dose in susceptible persons. That this reaction is a toxic one is evident, since it can be prevented by adding antitoxin to the toxin before injecting. Likewise it should be possible to prevent this reaction by stimulating immune body production in the rabbit through the injection of sufficient antigen. Eighteen rabbits, susceptible to one skin-test dose of raw toxin, received from 15,000 to 25,000 skin-test doses of raw toxin subcutaneously, a weighted mean of 20,000 STD per animal. At the end of 2 weeks 13 of these animals gave no reaction to 5 skin-test doses of test toxin when injected intradermally in the ear. As a control, 10 susceptible rabbits each received subcutaneous injections of 0.2 cc of plain broth. When retested 2 weeks later all 10 rabbits gave strong reactions to 5 skin-test doses of test toxin. Twenty-one susceptible rabbits were given subcutaneous injections of 0.2 to 0.3 cc of toxoid, Td-16, a weighted mean of 0.25 cc per animal, and when retested 2 weeks later 16 gave no ear reaction to 5 skin-test doses of test toxin. In each one of these tests the rabbits were also tested with a heated control (1 hour in streaming steam) of the same quantity as the test dose. A few animals reacted to the heated control, and these were considered negative when the reaction approximated in character that produced by the test toxin, an indication of pseudo-reaction. On the basis of these results, toxoid Td-16 would have the antigenic equivalent of at least 80,000 STD of raw toxin per cubic centimeter.

The raw concentrated toxin, table 1, toxin HL-32W, contains 175,000 STD of toxin per cubic centimeter, which would indicate that the process of detoxification destroys some of the antigenic value.

The point has been raised by Okell (8) and others that any antigenic stimulation obtained from scarlet fever toxoid is probably provided by the residual skin-reacting factor in the toxoid. Should this reasoning be correct, then the degree of immunity obtained by the injection of a given volume of the toxoid should be no greater than that produced by the injection of a sufficient number of skin-test doses of raw toxin to correspond to the skin-test doses of residual skin-reacting factor in the toxoid. A total of 1.6 cc of toxoid Td-16 has been used for human immunization. With a residual of 500 STD per cubic centimeter in this toxoid, the 1.6 cc would then represent the equivalent of 800 STD of raw toxin. Nine susceptible rabbits were each injected subcutaneously with 1.6 cc of toxoid Td-16, and a similar number each received 800 STD of raw toxin. Two weeks later all were retested with 1, 2½, and 5 skin-test doses, respectively, of test toxin and a heated control. Of the 9 toxin-treated rabbits, 4 showed immunity to 1 STD of control toxin and none to 2.5 STD, whereas the 9 toxoid-treated rabbits all showed immunity to 2.5 STD and 5 were negative to 5 STD.

ACTIVE IMMUNIZATION WITH SCARLET FEVER TOXOID

Approximately 1,700 persons having positive skin reactions to one human skin-test dose of toxin have been treated with the detoxified toxin, prepared in the manner already described.

Throughout this study a skin reaction was considered positive if one skin-test dose of standard toxin, when injected intradermally on the upper ventral surface of the forearm, produced within 24 hours a reaction measuring 10 mm in its greatest diameter irrespective of the intensity of the reaction.

In order to meet the requirements of practicability, and to meet the approval of physicians and parents, it was felt that the number of injections required should not exceed three, and that the children treated should experience no incapacitating sequelae. (It scarcely need be added that disease-preventive measures of this character are designed for the period of childhood and not for the adult.) At the same time, the object was to give each child no less antigen than is contained in the five immunizing doses of raw toxin as recommended by the Scarlet Fever Committee.

In the beginning of this study antigenic value of the toxoid was calculated volume for volume the equivalent of raw toxin, though it was considered highly probable that some of the antigen would be destroyed by the detoxification process. However, with the development of a rabbit method of measuring antigenic value, it becomes possible to

estimate the antigenic value of each batch of toxoid with at least a fair degree of accuracy.

A wide range of individual doses representing varying quantities of toxoid were tried during the course of this study in order to ascertain the maximum total volume of antigen tolerated as well as the minimum number of injections required. Sufficient toxoid to produce immunity in a high percentage of susceptible individuals could be given in two doses with an interval of 1 month between doses, as is demonstrated by groups A_3, C_1, C_{1A}, C_2, C_{2A}, C_3, E_2, E_3, and E_4. (See table 4.) However, doses of the volume required did produce constitutional symptoms in a certain number of individuals. By distributing the necessary volume of toxoid into three doses it was possible to eliminate constitutional symptoms entirely in children and reduce them to only a rare occurrence in adults. The 3-dose method with 3-week intervals was used with the other groups reported in table 4. The graduation of doses was not correct in each group, and so a few individuals in some of the groups did develop constitutional symptoms, namely, fever, headache, and, in a rare instance, nausea without vomiting. From this experience it was possible to determine the tolerance range; and subsequent clinical experience has shown that three doses of 0.1, 0.5, and 1.0 cc of toxoid, respectively, diluted if necessary to suitable volumes for injection, are tolerated without significant reaction, provided the toxoid meets certain requirements. These minimum requirements are those of toxoid Td-16 (table 2), which had been prepared from concentrated toxin HL-32W (table 1).

TABLE 2.—*Reduction in toxicity of scarlet fever toxin through the action of formalin and storage at 37° C., as measured by the skin-reacting factor*

Designation of toxin	Estimated potency of the raw toxin per cc	Designation of the resulting toxoid	Period of storage at 37° C	Quantity of formalin used	Estimated residual skin-reacting factor per cc after detoxification
	STD		*Days*	*Percent*	*STD*
1930	50,000	Td-1	56	0.4	1,000
HL23WA	75,000	Td-11	56	.3	500
HL25WA	200,000	Td-12	69	.4	500
HL26WA	200,000	Td-13	48	.4	1,000
HL27WA	200,000	Td-14	82	.45	1,500
HL32W	175,000	Td-16	64	.45	500
HL32W	175,000	Td-20	88	.45	500
HL34W	175,000	Td-21	66	.45	500

A detailed analysis of the individual doses of an average commercial toxin, offered for active immunization purposes, as compared with the three doses of toxoid, Td-16, is shown in table 3.

Reactions following injections.—The majority of children and all adults developed an area of erythema at the site of injection. This area varied from a few millimeters in diameter up to an area extending

over half the skin area from shoulder to elbow on the injected side of the arm. The intensity usually reached its maximum in 36 to 48 hours. The color was a dull, deep red, as contrasted with the bright scarlet erythema occurring with scarlet fever itself. Induration occurred in a limited number of cases and when present was restricted to a smaller area than the erythema. All cases showing induration showed tenderness on palpation and those with more extensive induration had some localized pain.

Constitutional symptoms were essentially absent in all younger children and occurred rarely in older children. Of 23 children, age 4 to 17 years, held under careful observation, a temperature of 37.5° C. was exceeded 11 times for the 3 injections, the maximum observed temperature being 38.3° C. In a group of 70 children, including the above 23, slight headaches were reported by 5 older children. No other systemic symptoms appeared. A third group of 219 children, 14 years of age or under, showed some local reaction in nearly each instance, with mild systemic symptoms reported in 4 of the older children. A fifth child, a boy of 10 years, became ill with dizziness, leg weakness, and nausea within 2 hours of each of the first 2 injections. He felt entirely well again in a few hours and nothing further developed. The cause of this reaction is not clear, though it does not suggest a toxin reaction.

TABLE 3.—*Comparison of the 5 immunizing doses of raw scarlet fever streptococcus toxin as recommended by the Scarlet Fever Committee and the 3 doses of scarlet fever streptococcus toxoid suggested by the present study*

Raw scarlet fever toxin			Scarlet fever toxoid Td-16				
Dose	Skin-test doses of toxin given per dose	Total mg of nitrogen given in each dose [1]	Dose	Skin-test doses of toxin in each dose before detoxification	Estimated antigenic value of each dose after detoxification	Residual skin reacting factor present in each dose in terms of skin-test doses	Total mg of nitrogen given in each dose
			cc				
1	500	3.9	0.1	17,500	8,000	50	32.2
2	2,000	15.7					
3	8,000	62.8	.5	87,500	40,000	250	161.1
4	25,000	196.2					
5	80,000	628.0	1.0	175,000	80,000	500	322.3
Total	115,500	906.6	1.6	280,000	128,000	800	515.6

[1] These figures represent the mean of the 5 commercial toxins reported in table 1, weighted by the potency of each. Total nitrogen in all instances is reported as milligrams per 100 cc of toxin or toxoid.

Twenty-four pupil nurses all developed local reactions of the character already described, though somewhat more pronounced than with the children. No nurse showed a temperature above 37.7° C., and five nurses developed mild headaches. A group of 36 adults, 44 years or under, showed more pronounced local reactions, and 10

developed systemic symptoms with 2 confined to bed with chills. There was no vomiting, and none developed a rash.

With systemic symptoms essentially absent in the young and occurring only occasionally in the adult, and with the symptoms, when present, limited to fever, headache, and chills, it was believed probable that they constituted reactions to something other than the toxin itself.

Pseudo-reactions.—At the time of the original skin test, 74 persons of various ages received on the opposite arm an injection of one STD of control toxin which had previously been heated for 1 hour in streaming steam (approximately 99° C.). Likewise, 653 persons who were originally skin positive were tested with a heated control at the time of the retest after immunization. The results in the two groups were as follows:

	Group I		Group II	
	Number	Percent	Number	Percent
Total persons tested	74		653	
Negative to toxin and the heated control	55	74.3	467	71.5
Positive to toxin and negative to heated control	18	24.3	145	22.2
Positive to toxin and positive to heated control	1	1.4	41	6.3

In an earlier portion of this paper it was shown that a temperature of 99° C. for 1 hour destroyed only 88.9 percent of the skin-reacting factor, whereas the same degree of heat for 4 hours destroyed at least 99.78 percent. Therefore, the frequency of pseudo-reactions in the above tabulation may be too high, owing to a small amount of active skin-reacting factor remaining in the heated control. It is evident that with this particular control toxin, the test of pseudo-reactions should be made with the same toxin after exposing it to streaming steam for 4 hours. However, if a test toxin of high titer is used (the National Institute of Health standard toxin contains 45,000 STD per cubic centimeter) pseudo-reactions become of such infrequent occurrence that for routine purposes the test may be omitted. Even in the presence of a pseudo-reaction the symptoms developing in the treated individual are sufficiently mild and transitory not to be significant.

First retest after immunization.—An attempt was made to retest each treated person 1 month after the injection of the last immunizing dose. Of 1,700 persons so treated, 1,168 were available for this retest, and of these 972 (or 83.2 percent) were Dick negative. Table 4 is presented to show the age range of the various groups treated, the lot number of the toxoid used, and the results of the retest in the various groups.

TABLE 4.—*Number of Dick positive persons given injections of scarlet fever toxoid and the character of the skin reaction upon retest with 1 human skin-test dose of toxin, 1 month after the last immunizing dose*

Designation of group	Age range in years (both inclusive)	Lot number of toxoid used	Retest 1 month after last immunizing dose: Number retested	Number negative	Percent negative
A_1	6-13	Td- 1	21	20	95.2
A_2	3-14	Td-11	22	19	86.3
A_3	4-14	Td-12	22	21	95.5
B_1	18-22	Td- 1	17	12	70.6
B_2	18-22	Td- 1	10	9	90.0
B_3	18-22	Td-13	13	10	77.0
B_4	18-22	Td-13	10	9	90.0
B_5	15-18	Td-11	9	8	89.0
C_1	5-16	Td-12	47	36	76.6
C_{1A}	17-53	Td-12	52	41	80.8
C_2	2-16	Td-12	145	109	75.1
C_{2A}	17-46	Td-12	133	106	79.6
C_3	6-17	Td-12	24	16	66.5
D_1	2-16	Td-12	147	124	84.4
D_2	1-16	Td-16	85	71	83.5
E_1	2-19	Td-12	116	94	81.0
E_2	5-16	Td-13	10	10	100.0
E_3	17-55	Td-13	91	87	95.6
E_4	18-52	Td-13	70	63	90.0
F_1	2-21	Td-11	31	27	87.1
G	5-15	Td- 1	93	80	86.0
Total	2-55		1,168	972	83.2

The Dick positive inmates of three institutions, not included in table 4, which care for tuberculous children, were treated with three doses of toxoid Td-16. On retest the skin reactions were as follows:

Institution	Elapsed time since last injection	Number present for retest	Percent negative on retest
	Weeks		
C_4	4	73	80.9
C_5	4	89	82.0
C_6	10	97	51.5

Institutions C_4 and C_5 were again retested approximately 10 weeks after the last injection so as to give information comparable to institution C_6 when the percent negative was 70.1 and 59.6, respectively. The results are considerably lower than the retests reported for well children in table 5. The children in these institutions were in various stages of tuberculous infection, and, in addition, institution C_6 went through epidemics of mumps and "grippe" during the immunization period. It is not known what influence such intercurrent diseases may have had on the production of scarlet-fever immunity. It may also be that the secondary infections invariably present in pulmonary tuberculosis have caused an excessively high percentage of pseudo-reactions. Unfortunately, no heated control test was made.

TABLE 5.—*Durability of the skin-negative phase following the injection of scarlet fever toxoid, insofar as this study has progressed. This table contains data on all persons included in table 4 who were present for the second retests except groups C_1, C_{1A}, C_2, and C_{2A}, which are separately reported*

Designation of group	Number immunized and Dick tested on 2 occasions	First retest			Second retest		
		Elapsed time before first retest	Persons negative		Elapsed time before second retest	Persons negative	
			Number	Percent		Number	Percent
					Months		
A_1	14	1 month	13	92.8	29	14	100.0
A_2	19	do	16	84.2	13	17	89.5
A_3	16	do	15	93.7	12	15	93.7
B_1	11	do	9	81.8	22	9	81.8
B_2	5	do	5	100.0	18	5	100.0
B_3	13	do	11	84.6	10	10	76.9
B_4	9	do	8	89.0	7	8	89.0
C_3	15	do	8	53.4	9	12	80.0
D_1	111	do	96	86.5	10	85	76.6
E_1	114	do	96	84.1	7	102	89.5
E_2	9	do	9	100.0	4	8	89.0
E_3	82	do	79	96.4	4	75	91.5
E_4	53	do	46	86.8	4	47	88.7
F_1	23	do	19	82.6	9	22	95.6
Total	494		430	87.3	8	429	87.0

Influence of age on immunity production.—Of the 1,168 persons reported in table 4, it was possible to study the relations between the age of the individual treated and immunity production in 848. As the following tabulation indicates, age does not appear to be a factor:

Age	Number retested	Percent negative	Age	Number retested	Percent negative
1	2		10	61	86.9
2	14	78.6	11	57	82.5
3	29	72.4	12	55	83.7
4	37	78.4	13	38	79.0
5	38	79.0	14	45	80.0
6	36	86.1	15	25	76.0
7	47	74.4	16	28	92.9
8	86	84.9	16 and over	198	78.2
9	52	88.5	Total	848	81.3

Second retest after immunization.—A second retest on as many of those persons reported in table 4 as were available was made shortly before preparing this manuscript, at which time 773 persons were present who had also received the first retest. Of this number, 494 (table 5) had received no subsequent treatment, and of these, 429 (or 87.0 percent) were negative on the second retest, as compared with 430 (or 87.3 percent) negative on the first retest. The mean weighted elapsed time in this group was 8 months. The remaining 321 persons who were present on the second retest, groups C_1, C_{1A}, C_2, and C_{2A}, respectively, were treated somewhat differently in that those

who were positive on the first retest were given additional injections of toxoid. Their second retests gave the following results:

Of 118 persons 16 years of age or less who had received two immunizing doses, all were negative on the first retest and 105, or 89 percent, were negative on a second retest 9½ months later.

Of 128 persons over 16 years of age who had received two immunizing doses, all were negative on the first retest, and 111, or 85 9 percent, were negative on a second retest 9½ months later.

Of 75 persons of various ages who had received two immunizing doses, all were positive on the first retest. An additional dose was given to 55 of these, and after a lapse of 8½ months 35, or 63 6 percent, had become negative. Three additional doses were given to the remaining 20, and after a lapse of 6 months, 17, or 85 percent, had become negative.

An analysis of the record on each person reported in table 5 shows that there were few changes in the individual skin reactions from one test to the other. Thus, of the 494 persons tested on the two occasions,

385, or 78.0 percent were negative on both tests;
45, or 9.1 percent, were negative on the first test and positive on the second;
20, or 4.0 percent, were positive on the first test and positive on the second;
44, or 8.9 percent, were positive on the first test and negative on the second.

If the size and intensity of the skin reaction can be taken as a criterion, those persons whose skin reactions were still positive at the time of the second retest seem to have built up some immunity. The mean original reaction of 93 such individuals measured 21.3 by 27.7 mm, as compared with a mean measurement of 12.3 by 15.9 mm for the same persons on the second retest when tested with some of the same lot of control toxin. The reactions had been reduced in size in all instances save three, and with these the mean had increased from 8 by 12 mm to 14 by 17 mm. The intensity of the retest reactions was either diminished or the same in each of the 93 persons.

How does the percentage of susceptibles who are rendered Dick negative following the injection of toxoid compare with the results obtained with the injection of raw toxin? Since the attempt was made to approximate in the toxoid dose the same amount of antigen as is contained in the dose of raw toxin recommended by the Scarlet Fever Committee, it is to be expected that the percentage of immunes resulting from the two treatments would be about the same. The results following treatment with toxoid have been presented in tables 4 and 5. There is presented in table 6 results reported by different workers with raw toxin immunization. Of the groups reported in table 6, only the first three received five injections containing the

quantities of toxin which are now recommended by the Scarlet Fever Committee, namely, 500, 2,000, 8,000, 25,000, and 80,000 skin-test doses, respectively, with weekly intervals. Literature contains very few reports of this character which are in sufficient detail for comparative purposes.

TABLE 6.—*Influence of injections of raw scarlet fever streptococcus toxin on the skin reactions of persons known to be susceptible. Both the original skin tests and the retests were made with one skin-test dose of toxin*

Reported by—	Number of persons retested	Total dose of raw toxin given	Interval between last dose and retest	Percent negative to 1 STD of toxin
Anderson [1 5]	60	115,500	1 year	83
Rhoads [2 5]	298	115,500	2 weeks	81
Smythe and Nesbit [3 5]	197	115,500	do	85
Smythe and Nesbit [3]	3,255	85,500	do	66
Dyer [1]	34	62,000	3½ years	91
Dyer [1 6]	122	42,000	13 days	96
Do	107	42,000	10 months	64
Kiefer [4]	114	35,500	1-2 years	61
Do	41	34,000	2 years	66
Kiefer [4 7]	577	5,000+	3 years	77
Kiefer [4]	799	5,000	21 days	39

[1] Unpublished data

[2] J A M A, v 97 153-156 (July 18, 1931)

[3] J Prevent Med, v 2 243-250 (May 1928).

[4] J A M A, v 91 1885-88 (Dec 15, 1928)

[5] The total dose injected in these groups represents the amount of toxin now recommended by the Scarlet Fever Committee

[6] The same group tested on 2 different occasions

[7] All these persons received 5,000 STD plus such additional quantities, in 5,000 STD doses, as were needed to render the skin reaction negative within a few weeks (the exact amount is not stated).

Prevention of scarlet fever.—The purpose of the clinical phase of this study has been to observe the tolerance of the toxoid injections and the subsequent effect on the skin reaction. However, in a very limited way there has been an opportunity to observe its protective value in human subjects. Scarlet fever had appeared each season in two of the institutions used. Following the treatment of those Dick positive, one institution has remained free from scarlet fever while the other has had no cases among those immunized, only in more recent admissions of unknown susceptibility. Two other institutions have had cases appear among untreated persons who were known to be skin positive but not in those immunized. A fifth institution experienced an outbreak of scarlet fever among recent admissions who had been neither tested nor treated. To date no cases have developed in the treated population or in persons known to be Dick negative. These experiences are too limited and indefinite to provide evidence for conclusive deductions but are suggestive. There is need for an immunization test on a community-wide basis with the retention of a satisfactory control group of known positive children living under identical conditions and of the same age range.

SUMMARY

A method has been presented for the concentration of the toxin which is elaborated by the hemolytic streptococcus of scarlet fever origin by which the toxin content is increased approximately four-fold without causing an increase in the total nitrogen content of the preparation above that now present in commercial unconcentrated toxins. This concentrated toxin may be detoxified by the action of formalin and storage at 37° C. in approximately 60 days so that there remains less than one half of 1 percent of the skin-reacting factor. This residual appears to be irreducible through continued storage. Its character is not fully understood, though it appears to be neutralizable by antitoxin.

Single injections into susceptible white rabbits indicate that this detoxified product possesses antigenic properties, though the detoxification process apparently does destroy a portion of the antigen.

Tests on susceptible persons indicate that toxoid, possessing the characteristics of toxoid Td-16 which is described in the text, may be given in a 3-dose method to children under 15 years of age without subsequent reactions except local erythema in a majority of children, accompanied by induration in a few and tenderness in a still smaller number and mild systemic symptoms (slight fever, headache) in only an occasional individual. Of the 1,168 persons retested with one STD of control toxin 1 month after the last injection, 972, or 83.2 percent, were Dick negative. Of 494 persons retested again, an average of 8 months after the last dose, 87.0 percent were negative as compared with 87.3 percent on the first retest.

In conclusion it should be emphasized that the results reported in this study were obtained through the use of a single strain of hemolytic streptococcus which had been cultured in the manner described. It is not known whether similar results could have been obtained through the use of other strains and other methods.

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(3) Wheeler, Mary W.:(1932) Notes on the antigenic activity of hemolytic streptococci from different types of injection. J. Immunol., vol. 23, pp. 311–314 (October).

(4) Coburn, A. F., and Pauli, R. H.:(1932) Studies on the relationship of streptococcus hemolyticus to the rheumatic process. J. Exp. Med., vol. 56, pp. 609–676 (November).

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(6) Wadsworth, A., and Quigley, J. J.:(1931) Studies on bacterial toxins. Concentration and purification of the toxin of streptococcus hemolyticus with acetone. J. Immunol., vol. 20, pp. 459–462 (June).

(7) Bunney, W. E.:(1931) The action of formaldehyde on diphtheria toxin. J. Immunol., vol. 20, pp. 47–59 (January).

(8) Okell, C. C.:(1932) Properties of erythrogenic (rash producing) toxin of the streptococci. The Lancet, vol. 222, pp. 815–820 (April).

OBSERVATIONS ON HEART DISEASE IN MARINE HOSPITAL PRACTICE

A Study of Organic Heart Disease in the United States Marine Hospital, Stapleton, N.Y., During the Fiscal Year 1931

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Ninety-one of the 3,517 admissions to the United States Marine Hospital at Stapleton, N.Y., from July 1, 1930, to June 30, 1931, were diagnosed as having evidence of organic heart involvement or angina pectoris. This represented about 2.6 per cent of the admissions for this period. These 91 admissions included a total of 79 individual cases. Among these there were 20 deaths, 15 of which were due to cardiac causes.

These patients, with few exceptions, were examined by the writer, either in his capacity as ward surgeon or in conjunction with electrocardiographic examinations. As far as practicable, statistical data are computed on the basis of individual cases, rather than admissions,

although in considering the clinical conditions at the time of admission, the latter is necessarily adopted.

The official nomenclature of the Public Health Service classifies heart disease from the viewpoint of the clinical interpretation of pathological findings and of certain changes of function, notably the arrhythmias. This omits two important factors in the evaluation of heart disease; namely, etiology and the determination of functional capacity. An endeavor has been made to supply these. The findings here are modeled on the bases of the etiological classifications offered by White,[1] Cabot,[2] the American Heart Association,[3] and others, but none of these systems of etiologic classification has been adopted entirely.

Table 1 takes into consideration the reasons for the admissions of these patients.

TABLE 1.—*Clinical distribution of 91 admissions to the United States Marine Hospital, Stapleton, N.Y., in which heart disease was diagnosed, during the fiscal year 1931*

Basis for admission	Etiologic classification					
	Syphilitic	Rheumatic	Degenerative	Other	Undetermined	Total
Cardiac	12	17	23	5	6	63
Medical	2	8	8	0	2	20
Surgical	2	0	1	1	1	5
Genito-urinary	0	1	0	0	1	2
Syphilis	1	0	0	0	0	1
Total	17	26	32	6	10	91

From Table 1 it will be seen that in approximately two-thirds of the instances in which heart disease was diagnosed it was the basis for the admission. In many other instances cardiac pathology played an important rôle. For example, a patient admitted for cerebral hemorrhage may at the same time show marked evidence of congestive heart failure.

A consideration is next given to the etiology of the various diagnoses made during the year. The diagnoses were all made on ante-mortem findings, and on the bases of the official nomenclature. Some were made by the writer, others, by various members of the staff. In a few instances where obvious omissions were made diagnoses were supplied, but in general the diagnoses in Table 2 represent those made during the course of the year.

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[1] Heart Disease. By Paul D. White. Macmillan Co. 1931.

[2] Facts on the Heart. By Richard C. Cabot. W. B. Saunders Co. 1926.

[3] Criteria for the Classification and Diagnosis of Heart Disease. New York Health and Tuberculosis Association. 1929.

TABLE 2.—*The etiology of various diagnoses made at the United States Marine Hospital, Stapleton, N.Y., during the year 1931*

Diagnosis	Etiology					
	Syphilitic	Rheumatic	Degenerative	Other	Undetermined	Total
Angina pectoris	0	0	2	0	0	2
Aneurysm, aortic	4	0	0	0	0	4
Aortitis	5	0	0	0	0	5
Hypertrophy and dilatation	0	0	2	0	0	2
Chronic cardiac dilatation	0	1	0	0	0	1
Myocardial and cardiac insufficiency	0	1	11	1	0	13
Endocarditis, septic	0	0	0	3	0	3
Myocarditis. chronic	0	3	14	1	5	23
Pericarditis, adhesive	0	0	0	0	1	1
Auricular fibrillation	0	7	3	2	1	13
Valvular diseases:						
Aortic insufficiency	10	1	0	0	0	11
Aortic stenosis	0	0	1	0	0	1
Mitral insufficiency	0	8	0	0	2	10
Mitral stenosis	0	14	0	0	0	14
Combined lesions, aortic and mitral	0	5	0	0	1	6
Total	19	40	33	7	10	109

Among the noteworthy features of Table 2 is the infrequency of the occurrence of the anginal syndrome. This condition was diagnosed in two patients during the year. In one instance it was secondary, the main condition being referable to the cerebrovascular system. The other case was characterized by an almost textbook picture of coronary thrombosis. There was prolonged substernal pain radiating down the left upper extremity and to the abdomen, not notably relieved by nitrites. This was followed by fever, leucocytosis, congestive heart failure, and a coronary T-wave on electrocardiographic examination. It would appear, based on experiences at this hospital and at the United States Marine Hospital at New Orleans, that both the anginal syndrome and coronary occlusion are rather infrequent among beneficiaries of the Public Health Service.

Aneurysm of the aortic arch was observed in four patients during life. An additional diagnosis was made on the basis of findings at necropsy. There were no deaths from aneurysm. In no instance was there severe dysphagia, aphonia, or erosion of bony structures.

Aortitis was diagnosed five times. In only two instances was it diagnosed without evidence of other manifestations of luetic heart disease, such as aneurysm or aortic insufficiency. This illustrates the need for definite criteria as guides in making diagnoses. One clinician will make an observation of the presence of aortitis in a given case while another will not. To what extent clinicians are called upon to go into the minutiæ of pathological diagnoses is a debatable point. Certainly from the viewpoint of clinical research it would be advisable to have definite standards to which diagnoses should conform.

Probably a number of simple cases of luetic aortitis are missed. This condition is easily diagnosed if borne in mind. The cardinal

points are a history of increasing dyspnea on exertion, indefinite anginoid pains, nocturnal dyspnea or cardiac asthma, and physical findings of a widened supracardiac area on percussion, a bell-like aortic second sound usually in the presence of a relatively low blood pressure, frequently an aortic systolic murmur, and characteristic X-ray changes. The serology is generally positive, but the condition should not be ruled out on the basis of a negative blood Wassermann reaction.

Diagnose of cardiac hypertrophy, hypertrophy and dilatation, cardiac dilatation, myocarditis, and cardiac or myocardial insufficiency were used interchangeably to express the findings in congestive heart failure and cardiac enlargement. Using the present nomenclature system, insufficiency of the myocardium would seem preferable in describing physiological changes brought about by the failing myocardium. When it is desirable to describe the anatomical changes in the heart muscle incident to either valvular or nonvalvular heart disease, the terms hypertrophy, hypertrophy and dilatation, dilatation, or fibrosis of the myocardium would appear preferable to that of myocarditis. Myocarditis describes pathological conditions which can usually be described only at the necropsy table. Its use should be restricted to the description of inflammatory changes in the heart muscle. With the exceptions of a few conditions such as the active state of rheumatic heart disease [4], acute diptheritic myocarditis [5], or syphilitic myocarditis as described by Warthin [6], it is not easy to see how this diagnosis can be made ante mortem. Even then, there is still considerable doubt in the minds of many regarding the syphilitic myocarditis described by Warthin. Certainly, it is unfortunate that myocarditis has been used to describe the fibrotic insults due to the involution of advancing years or to the outcome of diseases of the coronary arteries. Fibrosis of the myocardium is a more accurate description.

There is a tendency among clinicians to use certain medical terms quite loosely. "Myocarditis" serves as an example of this inexactness in current medical terminology. Myocarditis has been used as synonymous with congestive heart failure, precordial or substernal distress, almost any type of shortness of breath, senility, as descriptive of nonvalvular heart diseases, and general circulatory weaknesses occasioned by systemic conditions, such as pernicious anæmia, cancer, tuberculosis, the terminal events in acute infectious processes, or the effects of surgical operations and trauma. Similarily, in the past more than at present, "mitral insufficiency" has been ascribed to

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[4] Aschoff, L.: Zur Myocarditisfrage. Verhandl. d. deutch. path. Gesellschaft, 1904. vol. VIII, p. 46.

[5] Warthin, A. S.: Myocardial lesions of diphtheria. Jour. Inf. Dis., 1924, vol. XXXV, p. 32.

[6] Warthin, A. S.: Sudden death as an exacerbation of latent syphilitic myocarditis. Am. Heart Jour., 1925, vol. I, p. 1.

practically any type of heart, showing evidence of disease or otherwise, which on auscultation gives evidence of a systolic apical murmur.

The heart committee of the New York Tuberculosis and Health Association has made a commendable effort to rectify this state of affairs by adopting a system of diagnosis and describing the criteria for the diagnostic terms in a booklet entitled "Criteria for the Classification and Diagnosis of Heart Disease." Diagnoses made in the clinics affiliated with the association conform to the definitions set forth in the manual. This is of inestimable value for statistical purposes.

The diagnostic classification of the New York Tuberculosis and Health Association, also adopted by the American Heart Association, considers each case as far as possible from the viewpoints of etiology, anatomical changes, physiological alterations, and functional capacity. This scheme may be too complicated to become that of general usage among practitioners of medicine, but from the viewpoint of clinical research it has much to offer. For example, a case of mitral stenosis showing evidence of rheumatic activity, auricular fibrillation, and congestive heart failure sufficient to cause the patient to be bedridden would fall under the classification of (*A*) etiological, rheumatism (active); (*B*) anatomical changes, mitral stenosis; (*C*) physiological alterations, auricular fibrillation, congestive heart failure; (*D*) functional capacity, Class III, unable to carry on any activities. A case of syphilitic heart disease with a widened aorta, aortic insufficiency, cardiac enlargement, certain electrocardiographic findings, such as left ventricular preponderance and ventricular premature beats (extra systoles), and slight dyspnea on exertion would be considered as (*A*) syphilis (active or inactive); (*B*) aortitis, with dilatation of the aorta, aortic insufficiency, cardiac enlargement, left ventricular preponderance; (*C*) ventricular premature contractions; (*D*) Class IIa, activities slightly limited. A case of arteriosclerotic heart disease with hypertension and anginal syndrome resulting in considerable limitation of activities would be diagnosed (*A*) arteriosclerosis; (*B*) enlargement of the heart, fibrosis of the myocardium, sclerosis of the coronary arteries; (*C*) anginal syndrome; (*D*) Class IIb, activities greatly limited. In addition, patients who show abnormal signs or symptoms referable to the heart, such as murmurs of doubtful significance or precordial distress of undetermined etiology, are considered as "Possible heart disease, Class E." Patients without heart disease, who should be followed because of the presence or history of an etiological factor, such as rheumatism, syphilis, or hypertension, are diagnosed as "Potential heart disease, Class E." When it is considered that each factor in the diagnosis is made according to definition, it can be readily seen that it is possible to obtain a quite accurate conception of the clinical picture.

An elaboration of grouping of patients according to functional capacity will be made later in this paper.

Endocarditis was diagnosed three times during the year. In each instance nonhemolytic streptococci (*S. viridans*) were found in the blood stream. All of these patients died, one of embolic phenomenon, one of pneumonia, and the third of sepsis.

Of the valvular heart diseases, mitral stenosis was diagnosed most frequently. It is gratifying to note the infrequency with which the diagnoses of mitral insufficiency are being made. The day of labeling each individual with a systolic apical murmur as having an organic heart lesion is rapidly passing. It is not to be inferred that mitral insufficiency as a clinical entity does not exist. It is as much a part of the picture of rheumatic heart disease as mitral stenosis, and according to Coombs [7] may even precede it. Aortic insufficiency was diagnosed in 11 instances, 10 of which were considered to be of luetic origin. Aortic stenosis was diagnosed once. It was considered as being due to the type of calcareous heart disease described by Margolis et al.,[8] Christian,[9] and others. Combined aortic and mitral lesions were described five times, each instance being considered of rheumatic origin.

Auricular fibrillation was described 13 times as a diagnosis and 3 times as a physical finding. However, this condition should not be given as a principal diagnosis until every effort to find the lesion responsible for this physiological alteration has been exhausted.

From the viewpoint of etiology there were 15 cases of syphilitic heart disease, involving a total of 17 admissions. The average age was 44.3 years. Two cases of aortic aneurysm were under 30 years of age. Four patients having syphilitic heart disease died, three from heart disease. Among these 15 cases, positive blood Wassermann reactions were the bases for the luetic classification in 7 instances, positive spinal fluid reactions in 2 instances, histories of previous treatments in 2, and histories of penile ulcers in 3 instances. In one instance the diagnosis was based entirely on the type of cardiac findings, despite negative history and serology.

Rheumatic heart disease occurred in 21 cases, being found in 26 admissions. The average age of these patients was 34.7 years. There were four deaths, three of which were from cardiac causes. Histories of rheumatism were elicited in 14 of the 21 cases, 2 of which had scarlet fever, in addition to rheumatism and 2 had histories of tonsilitis. Of the 7 other cases, 1 case gave a history of chorea, 2 cases of tonsilitis, 1 case of scarlet fever, and 1 of repeated sore

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[7] Rheumatic Heart Disease. By C. F. Coombs. John Wright and Sons (Ltd.). 1924.

[8] Margolis, H. M., Ziellesen, F. O., and Barnes, A. R.: Calcareous Aortic Valvular Disease. Am. Heart Jour., vol. VI, pp. 349-374, February 1931.

[9] Christian, Henry A: Aortic Stenosis with Calcification of Cusps; Distinct clinical entity. J.A.M.A., vol. 97, pp. 158-161, July 18, 1931.

throats. In 2 cases the diagnoses were made on the bases of the distinctly rheumatic characteristics of the lesions, despite negative histories. In 11 of the 21 cases there was evidence of active carditis, joint manifestations, or tendencies to respiratory infections, the so-called rheumatic state described by Swift,[10] Coburn,[11] and others.

There is apparently no satisfactory term to describe the degenerative-senile heart changes. Many names have been used, including "hypertensive," "arteriosclerotic," "cardiorenal," "cardiovascular renal," "nephritic," "arteriorenal," "involutionary," "degenerative," "senile," and others. None is very satisfactory. Each tends to place undue emphasis on some particular aspect of the etiology of the types of heart diseases desired to be described. In each the personal views of the clinician plays too large a rôle. All seemingly fail to differentiate between lesions due to degeneration and those due to senility. From a public health viewpoint it is highly desirable to ascertain whether the apparent increase in heart disease is due to more frequent degenerative changes in middle age, or whether by reducing the deaths from infection and other diseases in early life, there are more people dying of senile changes. The 1931 edition of the Manual of the International List of Causes of Death [12] groups certain types of heart disease into those occurring before or after 45 years of age, a step which, although arbitrary, should be of considerable value. In the present study, due to the limited number of cases, the term "degenerative" is used without attempting further to subdivide the cases into the primarily degenerative and the senile. This group accounted for 32 admissions and represents 29 individual cases. The average age of these patients was 60.4 years. Among these 29 cases, in 6 the hypertensive element was dominant, in 7 others hypertension was associated with arteriosclerosis, in 8 there was evidence of arteriosclerosis without hypertension, in 2 nephritis, hypertension, and arteriosclerosis occurred, in 1 instance there was nephritis without hypertension or arteriosclerosis, and in 4 instances the diagnosis was based on the type of the clinical picture. In addition to the above, there were 2 instances of "angina pectoris," one of which was apparently due to a sclerosis with sudden occlusion of a coronary artery, and a symptomatic angina pectoris which was considered part of a general degenerative process.

The relative importance of arteriosclerosis and hypertension in the production of degenerative heart disease is a mooted point. Certain authorities (Cabot, White, et al.) stress the hypertensive factors. The New York Tuberculosis and Health Association, in

[10] Swift, Homer F.: Factors favoring the onset and continuation of rheumatic fever. Am. Heart Jour., June, 1931, vol. VI, p. 629.

[11] The Factor of Infection in the Rheumatic State. By Alvin F. Coburn. Williams and Wilkins, 1931.

[12] Manual of the International List of Causes of Death. Based on the Fourth Decennial Revision by the International Commission, Paris. October 16 to 19, 1929. U.S. Department of Commerce, 1931.

its manual on the criteria for diagnosis of heart disease, advises that when practicable a diagnosis of arteriosclerosis as the etiological factor be made, considering hypertension as a physiological rather than etiological factor in most cases. This presupposes a certain degree of arteriosclerosis, although not clinically evident, in most cases.

The ascribing of the dominance of arterioclerosis, hypertension, and in some cases nephritis in the production of this type of heart disease is dependent to a large degree on the views of the individual studying the cases. There is apparently no line of demarcation in determining just where each of these conditions begins or any gauge of their relative significance.

Of the miscellaneous cases, two showed evidence of thyrocardiac disease (hyperthyroidism) and three of subacute bacterial endocarditis. In each instance of subacute bacterial endocarditis, there was evidence that the infection was engrafted upon a pre-existing valvular lesion.

Among the 9 instances in which the etiologic diagnoses were undetermined, 2 were probably of rheumatic origin and 1 was of syphilitic etiology. Another case had pericardial adhesions of unknown origin. Another was considered as being a case of valvular heart disease due to trauma. This was not proved. The etiology of the remainder was entirely undetermined.

From the viewpoint of physiological changes this discussion is limited to whether or not the patient had heart disease severe enough to produce symptoms or evidence of congestive heart failure. Arrhythmias will not be considered.

Evidences of symptomatic disturbances due to heart disease include dyspnea, effort syndrome, palpitation, indefinite precordial or even anginal pains, pressure symptoms due to aneurysms, cardiac enlargement or distension of the pericardial sac, and peripheral manifestations, such as digestive disturbances, headaches, dizziness, faintness, etc., when of cardiac origin. Manifestations of congestion include, in addition to certain of the symptomatic disturbances just mentioned, congestion of the lungs, enlargement of the liver, cardiac asthma, orthopnea, œdema of the lower extremities, ascites, etc. As this study is made on the basis of the conditions of the patients at the time of admission, it is necessary to consider admissions rather than individual cases. As will be seen below, certain patients were admitted showing no symptoms of heart disease. These represent individuals showing stigmata of heart disease on physical examination, frequently unaware of its existence. The "symptomatic" group include those who had various subjective manifestations previously mentioned, but who gave no histories of congestive attacks. The group entitled "symptomatic—previously congested"

include those having only subjective complaints, but who gave histories of previous attacks of congestive failure. Those grouped under the heading of "congestive—first attack" include those admitted to the hospital in a state of heart failure of the congestive type, who had never experienced such a state before. Those considered as "congestive—previously congested" include those entering the hospital with manifestations of congestive heart failure who admitted histories of earlier attacks.

TABLE 3.—*Condition of 91 admissions to the United States Marine Hospital at Stapleton, N.Y., during the fiscal year 1931, regarding the presence or histories of symptoms of heart disease or manifestations of congestive heart failure. (Studied from the viewpoint of the etiological diagnoses)*

Presence or history of heart symptoms	Etiologic					
	Syphilitic	Rheumatic	Degenerative	Other	Undetermined	Total
Asymptomatic	2	4	1	0	3	10
Symptomatic	7	7	5	3	3	25
Symptomatic—previously congested	2	5	2	2	1	12
Congestive—first attack	3	2	10	0	0	15
Congestive—previously congested	3	8	14	1	3	29
Total	17	26	32	6	10	91

While it is not possible to reach any conclusions from so small a series, it is noted that the syphilitic group shows relatively little evidence of repeated bouts of heart failure. This is in keeping with the clinical observation that while rheumatic and, to lesser extent, degenerative cases show many attacks of heart failure, the patient suffering from syphilitic heart disease infrequently survives more than two or three such states. The observation that only two admissions among those having rheumatic heart disease involved the first attack of congestive heart failure is probably accounted for by the fact that the patients of the Public Health Service represent an age group older than that in which the first attacks of heart failure due to this disease ordinarily occur. The frequency with which both the first and subsequent attacks of congestion occur in cases of degenerative heart disease is accounted for, to a large extent, by the economic status of the beneficiaries. These patients enter the hospitals in states of congestive heart failure and undergo rest and enough treatment for them to be discharged from the hospitals. They are unable, however, to carry on the rigorous duties demanded of merchant seamen and other beneficiaries of the service, and soon find themselves back in the marine hospitals.

A further study was made from the viewpoint of the patients' functional capacity. This study, while similar in many respects to that presented here, embodies the system of classification of func-

tional capacity developed by the American Heart Association and the New York Tuberculosis and Health Association and used in their clinics. It is based on the ability of the patients to carry on the ordinary activities of life, and the restriction of these activities due to heart disease. Allowance must be made for age and factors other than cardiac which may affect the patient's activities. The classification is as follows:

Class I: Patients with organic heart disease able to carry on ordinary activities without discomfort.

Class II–a: Patients with organic heart disease whose activities are slightly limited. Ordinary physical activities produce undue fatigue, palpitation, dyspnea, and chest pain. Patients in this class rarely show any evidence of active cardiac infection, congestive heart failure, or anginal syndrome.

Class II–b: Patients with organic heart disease whose activities are greatly limited. Patients in this class suffer from dyspnea, palpitation, fatigue, or chest pain on less than ordinary activity. They also present some evidence of active cardiac infection, congestive heart failure, or anginal syndrome.

Class III: Patients with organic heart disease showing symptoms and signs of heart failure when at rest. These patients are unable to carry on any exertion without discomfort. They invariably show marked evidence of active cardiac infection, congestive heart failure, or anginal syndrome.

TABLE 4.—*Functional capacities, with reference to various etiologic factors, of 91 admissions involving cardiac diagnoses to the United States Marine Hospital at Stapleton, N.Y., during the fiscal year 1931, based on the condition of patients on entering the hospital. (The system of functional classification is that used by the American Heart Association)*

Classification of functional capacity	Etiologic classification					
	Syphilitic	Rheumatic	Degenerative	Other	Undetermined	Total
Class:						
I	2	3	1	0	3	9
II–a	5	7	6	2	1	21
II–b	3	6	10	0	2	21
III	7	10	15	4	4	40
Total	17	26	32	6	10	91

The basic figures in Table 4 are too small to justify any definite conclusions. That so many of the degenerative group are in Classes II–b and III offers an explanation why so many beds are filled with chronic cardiac cases.

It is suggested that ward surgeons and others keep this classification in mind in determining whether patients should be admitted for cardiac conditions and when they are fit for discharge. Class I obviously requires no treatment. Class II–a should not be admitted as in-patients, but can frequently be quite satisfactorily treated as out-patients. Class II–b represents borderline cases which would not usually be admitted to civilian institutions, but which frequently should be admitted to marine hospitals, preferably for short periods,

until their functional capacity has improved. Included in Class III are those cases which require rest in bed.

The adoption of such a system of functional diagnosis would have the added value that, upon transfer from one institution to another or upon subsequent admission, those handling the patients could obtain better ideas as to their conditions when last treated.

SUMMARY

Heart disease was found in 91 admissions among 79 patients during the fiscal year 1931 at the United States Marine Hospital at Stapleton, N.Y., and was responsible for 15 deaths. Degenerative types of heart disease were found in 29 cases and resulted in 7 cardiac deaths. Rheumatic heart disease was found in 21 cases and was the cause of 3 deaths. Syphilitic heart disease occurred in 15 individuals and was responsible for 3 deaths. The low incidence of syphilitic heart disease is noteworthy. The approximate age of the patients with rheumatic heart disease was 35 years; of luetic heart disease, 45 years; and of the degenerative group, 60 years. The average age of all cases of heart disease was approximately 48 years.

CONCLUSIONS

1. The etiology of heart disease should be given greater consideration in making cardiac diagnoses.
2. A study of patients' functional capacity is of value in determining their ability to carry on.
3. Angina pectoris and coronary thrombosis are apparently infrequent among the beneficiaries of the Public Health Service.
4. Syphilitic heart disease is not clinically as frequent as might be expected.

COURT DECISIONS RELATING TO PUBLIC HEALTH

Sexual sterilization law held constitutional.—(Oklahoma Supreme Court; In re Main, 19 P. (2d) 153; decided Feb. 14, 1933.) Acting under the 1931 law providing for the sexual sterilization of mental defectives (Session Laws 1931, pp. 80–82), the State board of public affairs ordered the sterilization of the appellant. This order was affirmed by the district court, and an appeal was taken to the supreme court. The appellant was afflicted with a hereditary form of insanity that was recurrent and was about to be discharged from the Central Oklahoma State Hospital.

One contention made on appeal was that the lower court had erred in finding that an operation of vasectomy and the resultant sterilization of the appellant would be without detriment to his general health, but the court held that the record sustained such finding. Another

contention was that the power conferred by the act upon the State board of public affairs, an administrative body, was judicial in character and, therefore, inhibited by the State constitution. The supreme court said that the board's duties were to some extent judicial or quasi-judicial in character, but, by reason of the act's provisions for a review and a trial *de novo* and a stay pending such review and trial before a judicial tribunal, held that the patient was not injuriously affected by the bestowal of quasi-judicial powers upon an administrative board, and, such being the case, he had no concern relative to the grant of those powers to such a board.

Concerning the appellant's view that the sterilization act was violative of the State constitutional provision inhibiting the infliction of cruel or unusual punishments, the court said that it was apparent that the constitutional inhibition had no application to surgical treatment of feeble-minded persons, but had reference to punishment after conviction of crime.

Another contention was that the act violated the provision of the State constitution that no person should be deprived of life, liberty, or property without due process of law, in that it deprived "a man of a part of his life, to-wit, the ability to produce life" or procreate. With respect to this, the court stated as follows:

> The phrase "without due process of law" is not without import in this connection. Therefore, assuming that the right to beget children is a natural and constitutional right, yet this right cannot be extended beyond the common welfare. Under the police power of the State and acting for the public good, the State may impose reasonable restrictions upon the natural and constitutional rights of its citizens. This statutory provision for sterilization of feeble-minded inmates of public institutions constitutes a reasonable restriction upon such natural and constitutional rights of such persons. [Case cited.]

A like contention as to unconstitutionality of the act, based upon the provision that "All persons have the inherent right to life, liberty, the pursuit of happiness, and the enjoyment of the gains of their own industry," was held to be without merit.

In concluding its opinion, the supreme court said:

> The attack is upon the procedure and the substantive law. The first is adequate and liberal—the latter is an enactment of public policy within the scope of the power of the legislature.

The judgment of the lower court was affirmed.

Sexual sterilization statute held unconstitutional as denying due process.—(North Carolina Supreme Court; *Brewer* v. *Valk* et al, 167 S.E. 638; decided Feb. 8, 1933.) Under the sexual sterilization law of North Carolina, it was the duty of the board of county commissioners, upon the petition and request of the legal guardian of a mentally defective person who was a resident of the county and not an inmate of any public institution, to have a sterilization operation

performed upon such defective. It was required, also, that such operation should have the approval of the State commissioner of charities and public welfare, the secretary of the State board of health, and the chief medical officers of any two of the institutions for the feeble-minded or insane of the State.

The plaintiff was adjudged incompetent to manage her affairs and a legal guardian was appointed. Such guardian thereupon requested the board of commissioners of the county to have a sterilization operation performed. In compliance with this request the commissioners authorized and ordered a certain physician to perform such operation upon the plaintiff. The latter, by her next friend, then brought an action to enjoin the performance of the operation, contending that the statute involved was unconstitutional because violative of the due process provisions of the Federal and State constitutions. The supreme court stated that the question was whether, under the due process requirement, the sterilization could be done without giving the plaintiff notice and an opportunity to be heard. Because of the absence in the act of any provision for such notice and hearing, the court declared the statute to be unconstitutional as violative of the due process requirement.

DEATHS DURING WEEK ENDED MAY 6, 1933

[From the Weekly Health Index issued by the Bureau of the Census, Department of Commerce]

	Week ended May 6, 1933	Corresponding week, 1932
Data from 85 large cities of the United States:		
Total deaths	7,957	8,276
Deaths per 1,000 population, annual basis	11 1	11 8
Deaths under 1 year of age	611	701
Deaths under 1 year of age per 1,000 estimated live births [1]	52	57
Deaths per 1,000 population, annual basis, first 18 weeks of year	12 0	12.5
Data from industrial insurance companies:		
Policies in force	68,357,913	73,403,421
Number of death claims	12,654	14,370
Death claims per 1,000 policies in force, annual rate	9 7	10 2
Death claims per 1,000 policies, first 18 weeks of year, annual rate	10 9	10.5

[1] 1933, 81 cities; 1932, 80 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended May 13, 1933, and May 14, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended May 13, 1933, and May 14, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended May 13, 1933	Week ended May 14, 1932	Week ended May 13, 1933	Week ended May 14, 1932	Week ended May 13, 1933	Week ended May 14, 1932	Week ended May 13, 1933	Week ended May 14, 1932
New England States:								
Maine		4	2	5	3	202	0	0
New Hampshire					40	16	0	0
Vermont	1				3	190	0	0
Massachusetts	20	33	1	3	623	1,015	0	2
Rhode Island	2	3				51	1	0
Connecticut		3	4	7	305	296	0	1
Middle Atlantic States:								
New York	80	97	[1] 12	[1] 20	3,205	2,437	5	5
New Jersey	33	33	4	14	1,575	917	1	2
Pennsylvania	56	80			1,635	1,937	6	9
East North Central States:								
Ohio	41	30	122	86	610	3,984	0	1
Indiana	12	17	14	15	292	123	4	9
Illinois	20	61	15	60	791	1,428	15	6
Michigan	19	11	16	6	822	2,715	2	3
Wisconsin	2	6	20	31	458	2,629	1	0
West North Central States:								
Minnesota	4	6	1		676	51	2	1
Iowa	12	11			83	9	2	1
Missouri	24	23	8	4	202	127	3	3
North Dakota	6	18			115	14	0	1
South Dakota	3	1	2		17	8	0	0
Nebraska	6	12			184	4	1	0
Kansas	7	2		1	301	496	2	0
South Atlantic States:								
Delaware	2		1		18	2	0	0
Maryland [2]	7	10	4	17	21	65	0	1
District of Columbia	6	7			30	26	1	2
Virginia	11				340		0	1
West Virginia	6	14	7	39	51	234	0	0
North Carolina	12	20	2	172	635	830	1	2
South Carolina	4	7	165	635	283	180	0	0
Georgia [3]	1	7	37	86	121	73	0	1
Florida [3]	11	5	2	7	32	9	0	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended May 13, 1933, and May 14, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended May 13, 1933	Week ended May 14, 1932	Week ended May 13, 1933	Week ended May 14, 1932	Week ended May 13, 1933	Week ended May 14, 1932	Week ended May 13, 1933	Week ended May 14, 1932
East South Central States:								
Kentucky	7	10	12	52	17	41	1	2
Tennessee	4	7	30	144	45	22	4	5
Alabama [3]	7	10	11	47	157	16	3	2
Mississippi	7	5					0	0
West South Central States:								
Arkansas	2	13	11	13	181	5	0	0
Louisiana	11	27	11	5	24	82	0	1
Oklahoma [4]	6	6	11	50	204	10	1	2
Texas [3]	54	16	108	18	1,569	563	4	0
Mountain States:								
Montana [5]	3		2	1	24	149	0	2
Idaho [5]			3		29	2	0	0
Wyoming [5]		1			30	27	0	0
Colorado	5	5	27		10	132	0	1
New Mexico	3	10			8	36	0	0
Arizona	3	9		2	74		0	0
Utah	1		2		17	2	0	0
Pacific States:								
Washington	3	3	1		65	258	1	1
Oregon [5]		5	28	36	97	282	0	1
California	30	66	37	57	1,388	717	2	2
Total	554	714	733	1,651	17,410	22,428	63	70

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended May 13, 1933	Week ended May 14, 1932	Week ended May 13, 1933	Week ended May 14, 1932	Week ended May 13, 1933	Week ended May 14, 1932	Week ended May 13, 1933	Week ended May 14, 1932
New England States:								
Maine	0	0	33	23	0	0	3	6
New Hampshire	0	0	8	50	0	0	0	0
Vermont	0	0	8	11	0	10	0	0
Massachusetts	1	0	305	461	0	0	2	5
Rhode Island	0	0	24	47	0	0	1	0
Connecticut	0	0	113	97	0	0	1	2
Middle Atlantic States:								
New York	0	1	770	1,556	0	1	14	13
New Jersey	1	0	252	341	0	0	5	2
Pennsylvania	1	0	873	707	0	0	13	5
East North Central States:								
Ohio	0	1	1,029	440	7	17	6	5
Indiana	1	0	127	67	2	6	2	2
Illinois	8	2	432	407	10	6	28	10
Michigan	1	1	508	506	0	14	5	2
Wisconsin	0	2	114	84	5	1	2	2
West North Central States:								
Minnesota	0	0	93	98	0	2	0	4
Iowa	0	0	22	38	8	26	1	0
Missouri	0	0	58	51	11	5	1	1
North Dakota	0	0	5	8	0	1	0	0
South Dakota	0	0	13	2	0	0	2	0
Nebraska	0	0	10	24	1	11	0	1
Kansas	1	0	51	42	2	6	2	2
South Atlantic States:								
Delaware	0	0	15	11	0	0	0	0
Maryland [3]	0	0	81	77	0	0	6	0
District of Columbia	0	0	17	25	0	0	0	0
Virginia	0		34		0		6	
West Virginia	0	0	24	18	0	0	5	5
North Carolina	0	0	37	41	2	2	7	4
South Carolina	0	0	4	5	0	0	17	12
Georgia [3]	0	0	10	8	0	2	8	19
Florida [3]	1	0	2	2	0	9	2	10

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended May 13, 1933, and May 14, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended May 13, 1933	Week ended May 14, 1932	Week ended May 13, 1933	Week ended May 14, 1932	Week ended May 13, 1933	Week ended May 14, 1932	Week ended May 13, 1933	Week ended May 14, 932
East South Central States:								
Kentucky	0	0	32	32	0	6	4	10
Tennessee	0	0	33	43	4	15	13	9
Alabama [3]	0	1	8	10	23	10	7	13
Mississippi	0	0	5	4	0	11	2	5
West South Central States:								
Arkansas	0	0	4	0	3	6	4	0
Louisiana	0	0	8	13	1	9	16	12
Oklahoma [4]	1	0	7	8	37	7	4	5
Texas [3]	2	1	52	13	31	49	13	8
Mountain States:								
Montana [5]	0	0	6	15	0	4	6	1
Idaho [5]	0	0	3	3	3	2	1	1
Wyoming [5]	0	0	11	12	0	0	0	0
Colorado	0	0	28	20	4	5	0	0
New Mexico	0	0	5	11	0	1	1	1
Arizona	0	0	5	1	0	0	0	0
Utah	0	0	4	3	0	0	0	0
Pacific States:								
Washington	2	2	50	27	7	25	3	0
Oregon [5]	0	0	37	7	11	9	1	2
California	1	4	150	174	42	9	7	5
Total	16	15	5,520	5,649	214	288	221	179

[1] New York City only.
[2] Week ended Friday.
[3] Typhus fever, week ended May 13, 1933, 26 cases: 5 cases in Georgia, 1 case in Florida, 14 cases in Alabama, and 6 cases in Texas.
[4] Figures for 1933 are exclusive of Oklahoma City and Tulsa and for 1932 are exclusive of Tulsa only.
[5] Rocky Mountain spotted fever, week ended May 13, 1933, 15 cases: 2 cases in Montana, 4 cases in Idaho, 5 cases in Wyoming, and 4 cases in Oregon.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
February 1933										
Puerto Rico		59	229	3,122	282	18	0		0	17
March 1933										
Puerto Rico		60	142	2,402	203	6	0	1	0	22
April 1933										
Florida	2	36	13	7		3	1	20	0	9
Iowa	10	43	1		115		0	140	70	1
Michigan	8	55	39	4	5,006		4	2,516	4	14
New Jersey	8	82	56	2	7,670		2	1,120	0	11
New York	16	274		6	14,905		3	3,797	0	35
North Dakota	2	8	15		317			34		1
Tennessee	12	56	405	93	303	32	2	192	4	18
Wyoming	3	2			45		0	55	0	6

February 1933

	Cases
Puerto Rico:	
Chicken pox	72
Dysentery	971
Filariasis	7
Leprosy	3
Mumps	27
Ophthalmia neonatorum	2
Puerperal septicemia	9
Tetanus	18
Tetanus, infantile	32
Trachoma	15
Whooping cough	118

March 1933

	Cases
Puerto Rico:	
Chicken pox	191
Dysentery	660
Filariasis	3
Mumps	32
Ophthalmia neonatorum	11
Puerperal septicemia	12
Tetanus	11
Tetanus, infantile	25
Trachoma	9
Whooping cough	100
Yaws	1

April 1933

	Cases
Actinomycosis:	
Wyoming	1
Anthrax:	
New Jersey	1
New York	1
Chicken pox:	
Florida	162
Iowa	179
Michigan	1,724
New Jersey	1,711
New York	3,688
North Dakota	56
Tennessee	326
Wyoming	61

April 1933—Continued

	Cases
Dysentery:	
New York	4
Tennessee	3
German measles:	
Iowa	12
Michigan	7,018
New Jersey	97
New York	216
Tennessee	136
Impetigo contagiosa:	
Tennessee	11
Lead poisoning:	
New Jersey	3
Lethargic encephalitis:	
Michigan	3
New Jersey	5
New York	14
North Dakota	7
Tennessee	1
Mumps:	
Florida	201
Iowa	397
Michigan	1,427
New Jersey	1,321
North Dakota	7
Tennessee	164
Wyoming	3
Ophthalmia neonatorum:	
New Jersey	4
New York	8
Tennessee	7
Paratyphoid fever:	
New York	6
Tennessee	1
Puerperal septicemia:	
Tennessee	2
Rabies in animals:	
New Jersey	27
New York	[1] 3
Rabies in man:	
Florida	1
Rocky Mountain spotted fever:	
Wyoming	13
Scabies:	
Tennessee	22

April 1933—Continued

	Cases
Septic sore throat:	
Michigan	33
New York	21
Tennessee	26
Wyoming	12
Tetanus:	
New York	5
Tennessee	2
Trachoma:	
New Jersey	1
North Dakota	1
Tennessee	32
Trichinosis:	
New Jersey	1
New York	12
Tularaemia:	
Tennessee	3
Typhus fever:	
Florida	1
Undulant fever:	
Iowa	23
Michigan	4
New Jersey	1
New York	25
Vincent's angina:	
Iowa	4
New York	[1] 83
Tennessee	14
Wyoming	1
Vincent's infection:	
North Dakota	14
Whooping cough:	
Florida	59
Iowa	53
Michigan	1,058
New Jersey	482
New York	1,841
North Dakota	8
Tennessee	200
Wyoming	14

[1] Exclusive of New York City.

WEEKLY REPORTS FROM CITIES

City reports for week ended May 6, 1933

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	0	-------	0	1	1	2	0	0	0	19	22
New Hampshire											
Concord	0	-------	0	0	0	1	0	0	0	0	5
Manchester	0	-------	0	0	1	2	0	1	0	0	29
Nashua	0	-------	0	0	0	0	0	0	0	0	-------
Vermont:											
Barre	0	-------	0	0	1	0	0	0	0	9	4
Burlington	0	-------	0	0	0	5	0	0	0	0	7
Massachusetts:											
Boston	7	1	0	192	22	70	0	9	0	39	217
Fall River	1	-------	0	1	1	9	0	1	0	7	40
Springfield	1	-------	0	1	0	14	0	1	0	9	34
Worcester	3	-------	0	7	2	18	0	2	0	11	35
Rhode Island:											
Pawtucket	0	-------	0	0	0	2	0	0	0	0	18
Providence	0	-------	0	2	1	21	0	3	0	20	68
Connecticut:											
Bridgport	0	-------	0	31	0	12	0	3	0	0	27
New York:											
Buffalo	3	-------	1	73	22	46	0	10	0	46	140
New York	45	26	5	1,592	160	259	0	84	7	127	1,542
Rochester	0	-------	0	2	6	26	0	2	0	11	69
Syracuse	0	-------	0	2	2	22	0	2	0	5	54

City reports for week ended May 6, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
New Jersey:											
Camden	4	-	-	6	-	19	0	-	0	0	-
Newark	0	2	0	260	3	23	0	7	0	33	94
Trenton	0	-	0	21	4	14	0	2	0	0	41
Pennsylvania:											
Philadelphia	1	-	1	398	35	133	0	21	0	5	473
Pittsburgh	2	5	4	8	11	62	0	6	0	29	134
Reading	1	-	0	35	2	9	0	1	0	7	32
Scranton	0	-	-	4	-	15	0	-	0	0	-
Ohio:											
Cincinnati	4	-	1	6	8	34	0	10	0	14	133
Cleveland	6	44	0	5	11	201	0	15	1	38	206
Columbus	3	-	0	13	3	31	0	3	0	0	65
Toledo	3	2	2	252	6	137	0	6	0	13	88
Indiana:											
Fort Wayne	4	-	0	0	3	10	0	1	0	0	31
Indianapolis	0	-	0	181	5	20	1	6	0	3	-
South Bend	0	-	0	5	3	3	0	3	0	11	26
Terre Haute	0	-	1	25	1	13	0	1	0	0	18
Illinois:											
Chicago	0	2	4	574	43	224	0	38	1	22	680
Springfield	2	-	0	2	0	2	0	0	1	0	24
Michigan:											
Detroit	14	9	1	368	15	150	0	17	2	124	223
Flint	0	2	0	31	1	5	0	0	0	3	15
Grand Rapids	0	-	0	9	3	5	0	1	0	13	36
Wisconsin:											
Kenosha	0	-	0	0	0	3	0	0	0	12	3
Madison	1	-	-	102	-	3	0	-	0	0	-
Milwaukee	0	2	2	1	2	30	0	5	1	39	94
Racine	1	-	0	0	0	9	0	0	0	17	12
Superior	0	-	0	0	1	0	0	0	0	9	8
Minnesota:											
Duluth	0	-	0	11	3	0	0	3	0	21	19
Minneapolis	1	-	3	34	10	50	0	5	1	31	119
St. Paul	0	-	0	532	0	20	0	0	0	99	51
Iowa:											
Des Moines	1	-	-	0	-	10	1	-	0	0	35
Sioux City	2	-	-	1	-	0	0	-	0	0	-
Waterloo	0	-	-	0	-	0	2	-	0	0	-
Missouri:											
Kansas City	2	-	0	59	8	42	0	2	0	3	80
St. Joseph	2	-	0	38	0	2	0	1	0	0	30
St. Louis	10	1	-	58	4	14	0	1	0	13	179
North Dakota:											
Fargo	0	-	0	2	1	0	0	0	0	0	14
Grand Forks	0	-	0	0	0	2	0	0	0	0	-
South Dakota:											
Aberdeen	0	-	-	0	-	1	0	-	0	0	-
Sioux Falls	0	-	-	0	-	2	0	-	0	0	10
Nebraska:											
Omaha	0	-	0	74	4	3	0	2	0	3	56
Kansas:											
Topeka	0	-	0	176	0	2	0	0	0	7	5
Wichita	0	-	1	0	1	0	0	0	0	1	34
Delaware:											
Wilmington	0	-	1	2	4	2	0	0	0	4	29
Maryland:											
Baltimore	4	3	1	1	15	77	0	14	0	30	199
Cumberland	0	-	0	7	0	1	0	0	0	0	9
Frederick	0	-	0	0	0	1	0	0	0	1	-
District of Col.:											
Washington	2	-	0	16	7	14	0	9	0	7	147
Virginia:											
Lynchburg	2	-	0	4	0	0	0	1	0	15	19
Norfolk	0	-	0	4	0	5	0	1	0	6	24
Richmond	0	-	0	5	2	6	0	3	1	0	40
Roanoke	0	-	0	21	0	2	0	1	0	2	20
West Virginia:											
Charleston	0	2	1	0	0	1	0	1	1	0	19
Huntington	2	-	-	2	-	4	0	-	0	0	-
Wheeling	0	-	0	4	4	1	0	0	0	8	15
North Carolina:											
Raleigh	0	-	0	2	2	2	0	0	0	3	10
Wilmington	0	-	0	91	1	0	0	0	0	2	12
Winston-Salem	0	-	0	9	1	3	0	4	0	1	11

City reports for week ended May 6, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
South Carolina:											
Charleston	0	9	1	0	0	1	0	3	0	9	20
Columbia	0		1	0	4	0	0	0	0	0	22
Greenville	0		0	6	0	0	0	0	0	0	4
Georgia:											
Atlanta	1	15	2	32	5	2	0	4	0	26	61
Brunswick	0		0	1	0	0	0	1	0	0	3
Savannah	0	19	0	0	3	2	0	1	1	0	33
Florida:											
Miami	1		0	1	0	0	0	4	0	4	28
Tampa	0	1	1	0	0	0	0	1	0	3	18
Kentucky:											
Ashland	0		0	5	0	0	0	0	1	5	
Tennessee:											
Memphis	0		0	26	2	3	0	9	1	40	71
Nashville	0		1	4	2	2	0	1	0	0	50
Alabama:											
Birmingham	0	4	2	3	3	1	0	5	0	8	52
Mobile	0		2	8	0	0	0	2	0	0	22
Montgomery	2			19		0	0		0	5	
Arkansas:											
Fort Smith	0			1		0	0		0	2	
Little Rock	0		0	120	2	0	0	2	0	1	4
Louisiana:											
New Orleans	8	3	0	8	7	6	0	5	4	1	114
Shreveport	0		0	0	5	0	0	4	0	0	50
Texas:											
Dallas	13	1	1		3	14	0	3	1	6	55
Fort Worth	1			7		2	1	0	0	0	
Galveston	0		0	2	2	2	0	3	1	0	18
Houston	4		2	2	4	3	0	3	3	0	73
San Antonio	3		0	28	6	0	0	10	0	0	71
Montana:											
Billings	0		0	0	0	0	0	0	0	0	9
Great Falls	0		0	2	0	2	0	0	0	3	3
Helena	0		0	0	0	0	0	0	0	0	5
Missoula	0	1	1	2	0	0	0	0	0	0	7
Idaho:											
Boise	0		0	14	0	0	7	0	0	0	7
Colorado:											
Denver	0	27	1	1	5	10	0	5	0	4	71
Pueblo	0		0	0	0	0	0	0	0	9	10
Utah:											
Salt Lake City	0		0	5	0	6	0	1	0	18	23
Nevada:											
Reno	0		0	0	0	1	0	0	0	0	4
Washington:											
Seattle	0	7		6		16	0		0	5	
Spokane	0	2		2		1	0		0	0	
Tacoma	0		0	0	3	4	0	2	0	1	25
Oregon:											
Salem	0			12		0	0		0	0	
California:											
Los Angeles	19	9	1	553	13	43	19	24	1	55	271
Sacramento	0	2	0	2	2	1	0	2	0	49	23
San Francisco	0		0	2	10	9	0	15	0	71	145

City reports for week ended May 6, 1933—Continued

State and city	Meningococcus meningitis		Poliomyelitis cases	State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				Missouri:			
Boston	1	2	1	St. Joseph	1	0	0
				St. Louis	1	1	0
New York:				Nebraska:			
New York	2	0	1	Omaha	2	0	0
Pennsylvania:							
Pittsburgh	0	1	0	Maryland:			
				Baltimore	1	1	0
Ohio:				Virginia:			
Cleveland	1	0	0	Roanoke	1	0	0
Indiana:							
Fort Wayne	1	0	0	Tennessee:			
Indianapolis	0	0	1	Memphis	0	0	1
Illinois:							
Chicago	8	4	0	Texas:			
Michigan:				Houston	0	0	1
Detroit	1	2	0				
Flint	2	0	0	California:			
				Los Angeles	0	0	1
Iowa:				Sacramento	0	1	0
Sioux City	1	0	0				

Lethargic encephalitis.—Cases: Toledo, 1; Pittsburgh, 1; Tampa, 1.

Pellagra.—Cases: Baltimore, 1; Winston-Salem, 1; Charleston, S. C., 2; Savannah, 1; New Orleans, 4; Dallas, 1.

Rabies (in man); 1 death at Birmingham.

Typhus fever.—Cases: Montgomery, 1.

FOREIGN AND INSULAR

ITALY

Communicable diseases—4 weeks ended January 8, 1933.—During the 4 weeks ended January 8, 1933, cases of certain communicable diseases were reported in Italy as follows:

Disease	Dec. 12-18		Dec. 19-25		Dec. 26-Jan. 1		Jan. 2-8	
	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected
Anthrax	21	21	14	11	11	10	18	16
Cerebrospinal meningitis	10	7	5	5	5	5	6	6
Chicken pox	332	120	248	91	197	80	365	113
Diphtheria and croup	1,030	444	739	358	512	382	881	398
Dysentery	3	3	2	2	6	4	4	4
Lethargic encephalitis	2	2	2	2			3	3
Measles	1,458	219	962	166	1,039	181	1,414	226
Poliomyelitis	11	10	6	6	9	9	14	14
Scarlet fever	725	215	413	153	441	177	386	148
Typhoid fever	685	357	392	218	430	263	391	229

JAMAICA

Communicable diseases—Four weeks ended March 25, 1933.—During the 4 weeks ended March 25, 1933, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island of Jamaica, outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chicken pox	4	8	Tuberculosis	37	94
Dysentery	5	4	Typhoid fever	11	38
Puerperal fever		6			

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Hygiene, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; D, deaths; P, present]

Place		Oct. 16–Nov. 12, 1932	Nov. 13–Dec. 10, 1932	Dec. 11, 1932–Jan. 7, 1933	Jan. 8–Feb. 4, 1933	Week ended—													
						February 1933			March 1933				April 1933					May 1933	
						11	18	25	4	11	18	25	1	8	15	22	29	6	13
China:																			
Amoy	C			6															
Canton	C		1																
Macao	C											1							
	D											1							
Swatow	C	3																	
India	C	2,411	3,453	4,524	3,396	573	762	768	1,068	1,032									
	D	1,336	1,907	2,400	1,721	288	364	395	523	530									
Bombay	C	5			1				1						1				
Calcutta	C	69	53	54	110	14	35	41	21	50	53	93	131	136	181				
Chittagong	C						1					1	4	3	8	5			
Karachi	C																1		
Rangoon	C														1				
India, French: Chandenagor	C				1	2													
Indo-China (see also table below):																			
Pnom-Penh	C			1									1						
Saigon and Cholon	C	1			2								1		1	2	1		
Philippine Islands:																			
Cebu Province	C						7	8	2	2									
Iloilo Province—Iloilo	C																	1	
	D																	1	
Leyte Province	C		7	80	110	21	7	26	24	23		1	2		9	3	32	9	
	D		7	44	76	14	6	23	13	21		1	2		7	4	35	8	
Rizal Province	C																	1	
Samar Province	C	53	35	135	121							[1] 186			17				
	D	42	26	101	75							[1] 111			59				
Siam	C	1		1	2											1			

Place		October 1932	November 1932	December 1932 1-10	December 1932 11-20	December 1932 21-31	January 1933 1-10	January 1933 11-20	January 1933 21-31	February 1933 1-10	February 1933 11-20	February 1933 21-28	March 1933 1-10	March 1933 11-20
Indo-China (French) (see also table above):														
Cambodia[2]	C	4	1	1	1	3				9		1		2
	D	3	1	1		1				6				1
Cochin-China[2]	C	10	1	2	3	3	1	4	2	9	2	1	8	4
	D	7	1	2	3	1	1	1		6	2	1	7	3

[1] For month of March 1933.

[2] Reports incomplete.

PLAGUE[1]

Place		Oct. 16–Nov. 12, 1932	Nov. 13–Dec. 10, 1932	Dec. 11, 1932–Jan. 7, 1933	Jan. 8–Feb. 4, 1933	Week ended— February 1933 11	18	25	March 1933 4	11	18	25	April 1933 1	8	15	22	29
Angola	C		P				P										
Argentina:																	
Cordoba Province	C			2	1	5						5				1	
Jujuy Province	C				10				6								
La Rioga Province	D	4															
Rosario	C											2					
Salta Province	C	7	12													7	
San Luis Province[2]	C		P														
Santa Fe	C			1													
Belgian Congo	C			1													
British East Africa (see also table below):																	
Tanganyika	D		1		2					1							
Uganda	C	192	194	141	58	11	7	14	8	9	10	9					
	D	189	169	134	58	10	7	14	9	9	10	9					
Ceylon:																	
Central Province	C				9						4	2					
	D				7						4	2					
Colombo	C	9	11	4	5	4	1	3	2	11		1	1		1		
	D	8	7	3	3	2	1	2	2	9		1	1				
Plague-infected rats		5		4			3	1									

[1] Including plague in the United States and its possessions.

[2] Several cases of plague with 1 death were reported at Quines, San Luis Province, Argentina, on Dec. 9, 1932.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

[C indicates cases; D, deaths; P, present]

Place		Oct. 16–Nov. 12, 1932	Nov. 13–Dec. 10, 1932	Dec. 11, 1932–Jan. 7, 1933	Jan. 8–Feb. 4, 1933	Week ended— February 1933			March 1933				April 1933				
						11	18	25	4	11	18	25	1	8	15	22	29
Dutch East Indies:																	
Batavia	C										[3] 1						
West Java	C	502	610	1,152	1,329	262	312	299	278								
	D	502	608	745													
Ecuador. (See table below.)																	
Egypt:																	
Alexandria	C			2	1					1						1	
Assiout	C			6	4	1	2	1		4	2		2	4	4	2	2
Minieh	C	1									1	1				1	
France: Marseille	C			1													
Hawaii Territory:																	
Hawaii Island:																	
Hamakua—Kukaiau	C				1												
	D				1												
Plague-infected rats				2	7												
Paauilo—Plague-infected rats			1	11	1												
Maui Island—Makawao:																	
Plague-infected rats					1												
Omaopio—Plague-infected rats					1												
India	C	5,422	6,104	6,900	6,662	1,446	1,935	1,494	1,524	1,587							
	D	3,074	3,060	4,349	4,191	898	1,304	914	859	970							
Bassein	C	1			1			1	1	1	4	3	4	4		6	
Plague-infected rats		1	1	1	1	1	1						1		1		
Bombay	C	3						3		2	1	6	6	2	2	3	
Plague-infected rats		34	15	16	28	11	21	14	22	26	26	25	44	22	23	28	
Madras Presidency	C	266	546	446	508	95	93	107	83	57	60						
	D	92	197	249	170	43	32	47	51	27	30						
Rangoon	C	2	3	1	1		1		1	2							
Plague-infected rats					1		1		1	1							
Indo-China. (See table below.)																	
Iraq: Baghdad	C	3	1			1	1		1		1						
Madagascar. (See table below.)																	
Morocco	C		10	16				3	1	14	8	9	2		12		
Peru. (See table below.)																	
Senegal. (See table below.)																	

Siam	C																
South-West Africa.[4]																	
Straits Settlements: Singapore	C															1	
Syria: Beirut	C	9	12													1	
Union of South Africa: Orange Free State	C	P	P	P	4	1											
United States: California—San Benito County—Plague-infected ground squirrels					1												
On vessels:																	
S.S. Kingsborough at port in Argentina	C											1					
S.S. Patris at Beirut	C	3															

Place		November 1932	December 1932	January 1933	February 1933	March 1933	April 1933
British East Africa (see also table above): Kenya	C	5	8	6	11	6	2
Ecuador	C			1		3	
Indo-China	C	2	3	4	4	4	6
	D	2	3	2	4	4	5
Madagascar:							
Province:							
Ambositra	C	41	149	158			
	D	35	125	146			
Antisirabe	C	25	57	63			
	D	25	56	61			
Maevatanana	C	8	9	2			
Miarinarivo	C	35	37	75			
	D	31	36	14			
Moramanga	C	220	186	163			
	D	228	183	159			
Madagascar—Continued							
Province—Continued							
Tamatave	C	1	1			1	
	D	1	1			1	
Tananarive	C	209	186	198			
	D	199	179	190			
Peru	C	10	12	4	18	7	
Department:							
Ancachs	C	[5] 2					
Libertad	C	[5] 2					
Lima	C	8					
Piura	C	[5] P					
Senegal: Dakar[6]	C	6	19	2	1	1	1
	D	4	17	2	1		

[3] Imported.
[4] 227 cases of plague with 53 deaths were reported in Ovamboland, South-West Africa, up to Dec. 17, 1932. Antiplague measures have been taken.
[5] Suspicious cases.
[6] Incomplete reports.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX

[C indicates cases; D, deaths; P, present]

Place		Oct. 16–Nov. 12, 1932	Nov. 13–Dec. 10, 1932	Dec. 11, 1932–Jan. 7, 1933	Jan. 8–Feb. 4, 1933	Week ended—											
						February 1933			March 1933				April 1933				
						11	18	25	4	11	18	25	1	8	15	22	29
Arabia—																	
Algeria:																	
Algiers	C	2	1	1													
Constantine Department	C										1						
Aden	C	1	3	1	2			1									
Argentina:																	
Chaco Territory	C							P									
Jujuy Province	C	1															
Belgian Congo	C		122	88													
Belgium	C	1															
Bolivia	C			5				39									
Brazil:																	
Parahyba—Joao Pessoa	C		P														
Pernambuco—Recife	C	7	4														
Porto Alegre (alastrim)	C	26	8	16	1												
British East Africa:																	
Kenya	C						1		13	1	18	4					
Tanganyika	C	74	66	49	95	18	15		23	25	18						
British South Africa:																	
Northern Rhodesia	C	40		6		1					13	8					
Southern Rhodesia	C	27	1	1	25	22											
Canada:																	
Alberta	C		1											[1] 6			
British Columbia	C																
Manitoba	C	2		13													
Ontario	C		3	5						3		2		[1] 3			
Toronto	C		3	3										[1] 2			
Saskatchewan	C		3	1	5	22		9		4		10					
Ceylon:																	
Colombo	C		28	72	75	18	7	5	4	1	1	1	1	1	1		
Galle	C															39	

China:																	
Amoy	C				1	1	1	2	1	1		1	1	1			
Canton	C	28	180	762	504	85	86	41	22	26	17	10	11	13	10	11	6
	D	2	14	23	13		1									1	1
Chemulpo	C					17											
Dairen	C		2	1	4				5		2						
Foochow	C	P	P	P	P		P		P		P						
Hong Kong	C		2	18	78	32	28	63	46	53	43	37	36	36	14	20	14
Macao	C			P	3	2	2	2	2	2	2	2	5	3	1		
Nanking	C		6	11	38		23	17	49	10	1		5				
Shanghai	C	5	13	23	41		17	9	2	16	7	8	7	9	8	15	7
Swatow	C	4	8	7	22	9	8	2	2	3	8	9	6	6	7	3	
Chosen. (See table below.)																	
Colombia: Cali	D		1														
Dahomey	C	6		5	22	21	4	7									
Dutch East Indies	C	2			1												
Egypt:																	
Alexandria	C	23	77	583	987	301	300	195	147	104	82	59	32	12	11	11	8
	D	13	18	116	227	52	56	40	35	25	23	11	11	3	22	8	2
Cairo	C		1	8	37	6	9	9	1	7		2		1	2	2	5
Gharbieh	C			37													
Port Said	C				2					1	2	3		3			
Suez	C				2				4	1	2						
Gold Coast. (See table below.)																	
Great Britain:																	
England and Wales	C	116	72	79	66	25	20	22	9	15	23	15	18	31	14	18	
London	C	76	68	73	59	22	16	20	8	13	21	11	17	21	9	13	
London and Great Towns	C	110	71	76	66	21	20	22	9	13	22	14	17	30	9	14	
Greece. (See table below.)																	
Honduras:																	
Puerto Castilla	C		1							2							
Tegucigalpa	D										8	6				1	
Tela	C	2	1	2	4	3	1	2		1	2					1	
India	C	4,179	7,919	11,284	20,423	6,699	7,516	8,807	8,802	8,021							
	D	1,013	2,239	3,523	5,907	1,906	1,889	2,188	2,320	1,932							
Bassein	C					2	1	2	2	5	2	3	3	11	12	10	
	D						1		1	1	1	1	2	3	3	3	
Bombay	C	33	87	230	805	332	408	377	405	358	341	259	217	159	141	115	
	D	15	35	98	391	164	210	206	215	286	178	142	111	94	72	65	
Calcutta	C	53	103	301	961	322	399	533	383	299	392	460	569	295	215		
	D	24	47	213	672	263	213	551	316	188	281	314	270	244	188		
Cochin	C	1								2	2			2	1	1	
Karachi	C		14	25	45	8	15	13	11	29	22	23	41	31	31	31	
Madras	C	140	119	156	351	117	104	130	213	153	143	195	175	138	125	115	
Moulmein	C					1											
Negapatam	C	3	4	2	3	1		1			2		2	1		2	
Rangoon	C	3	2	2	5	1	6	3	10	3	2	2	4	7	1	2	
Tuticorin	C	12	13											1			
Vizagapatam	C			1									5	1			
India (French): Pondichery Territory	C		3	2													
Indo-China (see also table below): Saigon and Cholon	C	1		2			2		1		4	2	1			2	

[1] For 2 weeks.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths; P, present]

Place		Oct. 16–Nov. 12, 1932	Nov. 13–Dec. 10, 1932	Dec. 11, 1932–Jan. 7, 1933	Jan. 8–Feb. 4, 1933	Week ended— February 1933			March 1933				April 1933				
						11	18	25	4	11	18	25	1	8	15	22	29
Iraq:																	
Baghdad	C	10	31	13	8	2	1	1		1			1			1	1
Basra	C	85	81	25	6	2		1				1	1				
Ireland: Belfast	C							1									
	D							1									
Japan:																	
Kobe	C									1	1	1	2				
Nagoya	C							1									
Osaka	C					1	1	1		1	1		1	3	4		
Tokyo	C										1	1					
Yokohama	C															1	
Mexico:																	
Coahuila	C								1								
Juarez	C					3											5
Mexico, D. F.	C	4	2		10	3	1	1				6					
Monterrey	C	1															
Saltillo	D	3	11	8	4	1	3			1		2			1		
San Luis Potosi	D	3		2												1	
Torreon	C	1															
Morocco. (See table below).																	
Nigeria	C	56	1,581	583	401		291	2	1,585		444	3					
Persia	C	404	341	216	108		14	6	9	4	12	5	5	3	5		
	D	166	150	82	41		3		1	1	1	1	1	1	2		
Peru. (See table below.)																	
Poland	C			1													
Portugal:																	
Lisbon	C	5	9	12	4	3			1		1	1		1		1	
Oporto	C	1	14	9	5	2	1	2		1		1					
Siam: Bangkok	D				2		1	1			2	2					
Sierra Leone	C		13	10	217		29		7				63				
Sudan (Anglo-Egyptian)	C	8			57	13	12	4	5	19	6	3	4		12	1	5
Syria. (See table below.)																	
Turkey. (See table below.)																	
Union of Socialist Soviet Republics. (See table below.)																	

Place																	
Union of South Africa:																	
Cape Province	C	P	P	P			P	P	P	P	P	P					
Orange Free State	C	P	P	P					P	P	P	P	P				
Transvaal	C		P	P													
Zanzibar	C						2										
On vessels:																	
S.S. Amassis at Alexandria	C				1												
S.S. British Engineer at Marseille	C		1														
S.S. Somersetshire at Suez	C		1		1												
S.S. British Splendour en route to Gibraltar	C		1														
S.S. Jervis Bay en route to Southampton	C		1														
	D		1														
S.S. Star of Alexandria at Alexandria	C			1													
S.S. Kohistan at Aden from Basra	C		1														
S.S. Volturno at Alexandria	C								1								
S.S. Arimondi at Massaoua	C								2								
S.S. Hatasu at Malta	C									1							
S.S. Talma at Hong Kong	C							1									
S.S. Karapara at Rangoon	C							1									
S.S. Nawab at Rangoon	C				1												
S.S. California at Liverpool	C											1					
S.S. Kalgan at Bangkok from Swatow	C										1						

Place		October 1932	November 1932	December 1932	January 1933			February 1933			March 1933			April 1933	
					1–10	11–20	21–31	1–10	11–20	21–28	1–10	11–20	21–31	1–10	11–20
Indo-China (see also table above)	C	157	180	213	168	65	20	29	98	60	167	83			
	D	46	51	45	38	17	3	16	33	23	55	30			
Syria: Beirut	C		41	49	5	10	19	11	8		2	11	7	3	35

Place		October 1932	November 1932	December 1932	January 1933	February 1933	March 1933
Chosen	C				7	17	30
Gold Coast	C	3					
Greece	C					3	55
Morocco	C	33	53	81	14	14	
Peru	C	75	67		38		
Turkey	C	13			5		
	D	1					
Union of Socialist Soviet Republics	C	641					

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER

[C indicates cases: D, deaths; P, present]

Place		Sept. 18–Oct. 15, 1932	Oct. 16–Nov. 12, 1932	Nov. 13–Dec. 10, 1932	Dec. 11, 1932–Jan. 7, 1933	Week ended— January 1933			February 1933				March 1933				April 1933				
						14	21	28	4	11	18	25	4	11	18	25	1	8	15	22	29
Algeria:																					
Algiers	C	11	7	2			1	2	1	1			30	24	35	39	18	4	41	101	
Bone	C	2			1		1			1			1								
Constantine Department	C			3		1		2		1	3	34	26	21	32	16	4	3	36	96	
Argentina: Buenos Aires	C							6													
Bolivia. (See table below.)																					
British East Africa: Uganda	C	16	19	16	17	3	8	2	4	4	4	7	4	3	9						
Bulgaria	C			12	5	2						4	5	24	18	6					
Chile (see also table below)	C	61	41	166	223	81	65	84	68	47	34	51	52	23	30						
Antofagasta	C		1						1		1								1		
China: Hankow	C					3						5									
Colombia: Cali	D	1		1																	
Egypt:																					
Alexandria	C				1	1														6	6
Beheira	C	21		2					40							43					
Cairo	C															2	4	1	10	19	12
Gharbieh	C	1												70							
Port Said	C	1	1	1																	
Provinces	C	3			59	28			143				134		178						
Greece. (See table below.)																					
Guatemala. (See table below.)																					
Ireland: Belfast	C											1									
Irish Free State:																					
Cork County—Bandon	C	1																			
Dublin	C	2																			
Kerry County—Killarney district	C		1	16	5																
Lithuania. (See table below.)																					
Mexico:																					
Mexico, D.F.	C	3	11	10	3			2		3	6	2		5	1	4					
San Luis Potosi	D															1					
Torreon	C			2																	
Morocco	C	2		22	43	10	9	14	30	4	4	66	64	11	26	9		3	6	6	
Palestine	C	5	2	2	1	1						1	1	1		2		1		1	
Persia	C	10	2	11	16	3	3	6	4	7	13	1	19	9	4	2	13		18		
Peru. (See table below.)																					

Poland	C	120	63	65	152	40	68	74	95	86	77	94	93	91	93	64	87	92	87		
	D	9	13	6	8	6	9	4	7	6	4	5	5	8	6	2	4	8	6		
Portugal: Oporto	C	1																			
Rumania	C	9	7	121	254	59	89	71		71	62	80	63	61	63	66					
Tunisia: Tunis	C			1	9	4	6	25		1	20	8	5	2	10	21	9	4	17	26	
Turkey. (See also table below): Istanbul	C	1	1		3			5				1		3		1					
Union of Socialist Soviet Republics. (See table below.)																					
Union of South Africa:																					
Cape Province	C	P	P	P	P	P	P	P		P	P	P	P			P	P				
Natal	C	P	P	P	P	P				P	P	P	P	P		P					
Orange Free State	C	P	P	P	P	P	P	P		P	P	P	P	P		P	P				
Transvaal	C			P	P	P	P	P						P							
Yugoslavia. (See table below.)																					
On vessel: S.S. Munplace at New Orleans from Progresso	C							1													

Place		October 1932	November 1932	December 1932	January 1933	February 1933	March 1933
Bolivia	C			4	29	33	
Chile: Coquimbo Province	C		60				
Greece	C	4		15	10	2	
Guatemala	C			3	6	9	11
Lithuania	C		1	10	36	13	12
Peru	C	81	75	111	51		
Turkey	C	11	15	14	23	11	8
Union of Socialist Soviet Republics	C	1,727					
Yugoslavia	C		3	11	35	125	12

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

YELLOW FEVER

[C indicates cases; D, deaths; P, present]

Place		Oct. 16–Nov. 12, 1932	Nov. 13–Dec. 10, 1932	Dec. 11, 1932–Jan. 7, 1933	Jan. 8–Feb. 4, 1933	Week ended— February 1933			March 1933				April 1933					May 6, 1933
						11	18	25	4	11	18	25	1	8	15	22	29	
Brazil:																		
Ceara State	C	1	1															
Piauhy State	D			1														
French West Africa: Guinea	C	2	4															
	D	2	4															
Gold Coast	C						1		1									1
	D						1		1									
Guinea (Portuguese): Bissagos Islands	C				44													
	D				14													
Senegal	C	8																
	D	5																
Bakel	C												1					
Dagana	C										1							
	D										1							
Podor	C											1						
Sudan (French): Keyes	C	4	2															
	D	4	2															

UNITED STATES TREASURY DEPARTMENT

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ISSUED WEEKLY

BY THE UNITED STATES PUBLIC HEALTH SERVICE

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JUNE 2 - - - - - 1933

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UNITED STATES PUBLIC HEALTH SERVICE

HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst Surg Gen R. C WILLIAMS, *Chief of Division*

The PUBLIC HEALTH REPORTS are issued weekly by the United States Public Health Service through its Division of Sanitary Reports and Statistics, pursuant to acts of Congress approved February 15, 1893, and August 14, 1912.

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PUBLIC HEALTH REPORTS

VOL. 48 JUNE 2, 1933 NO. 22

HETEROLOGOUS EXPERIENCE (IMMUNIZATION) AS A FACTOR IN RESISTANCE TO DISEASE

By CHARLES ARMSTRONG and W T. HARRISON, *Surgeons, United States Public Health Service*

Instances in which nonfatal experience with one infection or with various nonliving antigens has apparently increased resistance to subsequent exposure to quite different infections or toxic substances have been rather frequently reported. Following is a brief review of the history of the subject:

HISTORICAL REVIEW

As long ago as 1893 Klein found that the intraperitoneal injection of a nonfatal dose of any one of several bacterial cultures would render guinea pigs refractory to an otherwise fatal dose of the same or of unrelated cultures given 8 to 12 hours later by the same route. Sobernheim (1893) confirmed Klein's findings and extended the interval between injections to 3 days. Klein further found that repeated subcutaneous inoculations with cultures of various organisms rendered guinea pigs refractory to usually fatal doses of cholera bacilli given intraperitoneally during an interval of at least 12 days following the last subcutaneous injection. Pfeiffer and Issaef (1894) found that a preliminary intraperitoneal injection of such substances as broth, peptone, urine, and the like so affected the tissues as to render guinea pigs likewise refractory to otherwise fatal doses of *B. cholera* given by the same route.

Vaughan and Palmer (1920) found that certain fractions from split proteins, whatever their source, when inoculated into animals would induce a resistance or tolerance to subsequent injections of similar protein fractions from other sources and also even against infection with bacteria. (The interval between injections extended to 11 and 12 days.) No specific action of the serum could be demonstrated.

Képinov (1924) and Balteau and Tudoranu (1925) also confirmed Klein's observations but used culture filtrates in place of the whole cultures for the primary inoculations.

Calmette and Marchoux (1895) noted that rabbits which had been immunized against abrine were less susceptible to anthrax infection than were controls. They were unable, however, to show that anti-abrine serum had any effect upon anthrax bacilli treated *in vitro*.

Deutschmann (1907) noted that repeated inoculation with yeast rendered animals increasingly resistant against infections.

Following 1918 a number of observers, notably Neumayer (1918), Rickmann (1919), Deusch (1919), Creischer (1919), Amelung (1919), Bochalli (1930) Leichtweiss (1930), and others, noted that influenza tended to attack tuberculous patients less frequently and less severely than was the case among nontuberculous patients. This was most apparent with the earlier and milder types of pulmonary tuberculosis, while those with a severe progressive form tended to bear influenza poorly.

Hirayama (1930) inoculated guinea pigs with virulent tubercle bacilli and in from 5 to 30 days re-inoculated them subcutaneously with anthrax bacilli. The tuberculous animals survived the anthrax inoculation more frequently than did the controls, and death, when it did occur, tended to be later. Similar results were secured in mice. In a later communication Hirayama showed that tuberculous guinea pigs likewise better withstood infection with streptococci and that they also showed a higher resistance to diphtheria toxin than did normal animals.

Ascoli (1928) stated that cultures of tubercle bacilli (B.C.G) administered to calves rendered them nearly refractory to the contagious pneumonia of young calves, which causes great ravages among the unvaccinated animals of Lombardy.

Ninni and de Sanctis Monaldi (1931) found that tubercle bacilli (B.C.G.) injected subcutaneously into guinea pigs rendered the inoculated pigs, after a lapse of 1 to 2 weeks, more resistant to intracutaneous inoculation with anthrax as shown by fewer and later deaths than were the controls.

Wright (1931) also stated that tuberculin (B.E.) increased the resistance of animals against both streptococcus and staphylococcus infections.

The observations of Lewis and Loomis (1924) have a possible bearing upon the action of tuberculosis in subsequent infections. These authors found that guinea pigs inoculated intraperitoneally with bovine tubercle bacilli, when injected three weeks later with sheep corpuscles, responded by a marked increase in hemolysin as compared with control pigs. In some instances the titer was as much as twentyfold greater than in the controls.

Dienes and Schoenheit (1926) showed similarly that tuberculous pigs injected with egg white responded more readily with the production of skin sensitiveness, precipitins, and complement-binding antibodies than did noninfected controls.

Nasta and Weinberg (1931) likewise found that rabbits inoculated with cultures (B.C.G.) one month previously, reacted sensibly higher in their production of hemolysin to sheep cells or in agglutinins against cholera than did normal controls. The same type of response had been noted by Bieling (1919), who showed that animals treated with dysentery bacilli were able to form agglutinins against typhoid bacilli when injected with only a fraction of the amount of antigen that was required to produce agglutinins in normal animals.

Calmette (1932) reported that B.C.G. in infants notably reduces the general mortality, and spoke of it as exerting a sort of "nonspécifique" immunity against diseases having no connection with tuberculosis.

Kinloch (1917) studied the effect of vaccinia upon the course of subsequently acquired acute infections in children under 5 years of age and found both complications and deaths fewer in the previously vaccinated group.

Clark, Zellmer, and Stone (1922) showed that multiple injections with various bacterial vaccines rendered rabbits increasingly resistant to typhoid bacilli intravenously administered some 11 days following the last preparatory inoculation.

Pierce, in 1928, working with syphilis in rabbits, noted that a coincident inoculation with vaccinia and syphilis gave an intensified type of syphilis. However, when the rabbits were inoculated with syphilis subsequent to vaccination the vaccine immune animals showed more resistance to the syphilis than did the controls. That a similar relationship is possible with virus infections is indicated by the work of Busson, who found that guinea pigs recently vaccinated with cowpox virus were often immune to infection with the street virus of rabies. Likewise, Gildemeister and Hilgers (1929) showed that a previous immunization of rabbits against either neurolapine or herpes virus induced an evident degree of protection against a subsequent inoculation with the other virus. Freund (1930) treated guinea pigs intraperitoneally on 5 or 6 successive days with herpes immune rabbit serum. Later when vaccinated on the pad with vaccine virus the "pro-

tected" animals developed smaller and less filled vesicles which dried earlier than was the case with the controls. Freund considered that his work confirmed Gildemeister and Hilger's views of an immunological relationship between the two viruses. This, however, cannot be held as his control pigs did not receive inoculations of normal rabbit serum, and it is possible that the inoculations of the foreign serum were accountable for his results. Bedson and Bland, moreover, attempted to confirm the views of Gildemeister and Hilgers relative to an immunologic relationship between herpes and vaccine virus by carrying out *in vitro* neutralization tests and then inoculating the virus serum mixtures in varying dilutions upon the skin of normal and immunized pigs. They were unable to show the presence of any cross neutralization, but their methods are not comparable to Gildemeister and Hilger's methods and while they do refute the latter's interpretations of their findings, they do not disprove the existence of a cross-protection.

Armstrong (1932) demonstrated that a series of injections with diphtheria toxoid, typhoid vaccine, or even plain broth rendered white mice increasingly resistant to an intracerebral inoculation with vaccine virus. Diphtheria antitoxin, however, administered intraperitoneally one day prior to the intracerebral inoculations offered no increased protection.

In addition, there are certain epidemiological observations bearing upon the influence of heterologous experience; for instance, Van Valzah (1915), at the University of Wisconsin, noted that male students, mainly rural, tended to have suffered fewer ailments prior to entering the university while after entrance they tended to suffer to a greater degree than did women students, recruited mainly from the towns. This difference was apparent in diseases wherein specific immunity due to a previous attack could hardly be considered as a factor. Clark, Zellmer, and Stone (1922) state that Van Valzah's observations have been verified year after year. Love and Davenport (1919) made a similar observation among army camps recruited from rural and city populations. The Poliomyelitis Commission of New York City (1919), moreover, noted that among 954 poliomyelitis patients 1 to 4 years of age the attack rate among the Schick positives was six to seven times as high as among the Schick negative children. Likewise, Ellicott, and Halliday (1930), in their studies of psittacosis in Maryland, noted that in rural homes every person who frequently handled psittacotic parrots or cleaned their cages developed the disease (10 cases), while among 21 similarly exposed city dwellers less than one half (10) developed psittacosis.

The work here reported was undertaken in an effort further to test the effect of heterologous experience upon resistance to disease.

EXPERIMENTAL

Experiment A

This experiment was planned to determine whether immunization of guinea pigs to tetanus would alter their resistance to the action of diphtheria toxin-antitoxin mixture. Since the paralyzing and killing effect of this agent is slow in appearing, it was felt that small differences in resistance could be more certainly shown than if a more rapidly fatal toxin were employed as the test material. The toxin-antitoxin mixture was selected for its strong paralyzing properties, 1 cc regularly paralyzing and killing normal guinea pigs. The tetanus toxoid and toxin used were prepared from an organism belonging to group 3 of Tulloch.

Thirty-two guinea pigs weighing from 200 to 250 grams were divided into 2 groups of 16 each One group received subcutaneously 5 cc of tetanus toxoid and the control group received subcutaneously at the same time 5 cc of normal salt solution. At the end of 30 days the guinea pigs which received the tetanus toxoid were injected with 5 MLD's of tetanus toxin to test for immunity.

During the 43 days prior to the injection of the toxin-antitoxin mixture, 9 guinea pigs of the 16 being immunized to tetanus and 8 of those receiving salt solution died from intercurrent affections Two, previously injected with tetanus toxoid and found immune, were added to the 7 immunized animals of this experiment and these 9 animals, together with the 8 controls, were injected, subcutaneously, with 1 cc of diphtheria toxin-antitoxin mixture. During the immediately

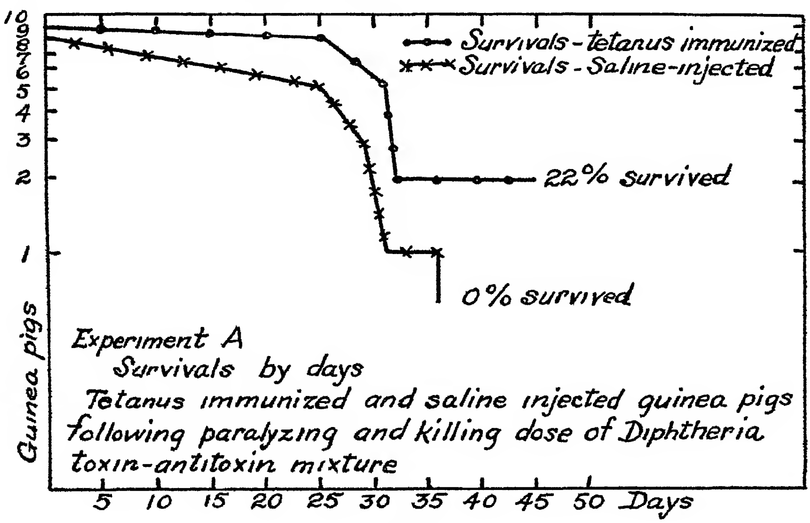

CHART 1

following 45 days, 7 of the 9 tetanus-immune guinea pigs died and 2 survived, 1 with and 1 without paralysis. Of the 8 controls all were dead from paralysis by the thirty-sixth day (chart 1).

Experiment B

This experiment was planned to determine further the increased resistance of tetanus-immune guinea pigs to the paralyzing action of diphtheria toxin and to determine whether this effect might be in part due to the antigenic action of the broth from which the tetanus toxoid was made, and also whether botulinus toxoid would act similarly to tetanus toxoid. Type B botulinus toxoid and toxin were employed.

Sixty-four guinea pigs weighing 250 to 270 grams were divided into 4 groups of 16 each and all were kept under identical conditions. The various groups received 3 injections, at approximately weekly inter-

vals, of 1 cc of tetanus toxoid, botulinus toxoid, broth, and normal salt solution, respectively. Forty days after the last injection the guinea pigs receiving tetanus toxoid were injected with 5 MLD's of tetanus toxin and those receiving botulinus toxoid were injected with 2 MLD's of botulinus toxin, to test for immunity.

Seventy-six days after the first immunizing injection, the surviving guinea pigs in all groups received 1 cc of diphtheria toxin-antitoxin mixture subcutaneously. At this time there were 10 tetanus-immune guinea pigs, 12 immune to botulinus, 12 which had received broth, and 13 which had received salt solution. Forty-five days following the test inoculation 3 tetanus-immune animals were still alive, all had shown paralysis, and 7 had died; 6 botulinus-immune animals had survived, all had shown paralysis, and 6 had died; 2 broth-injected

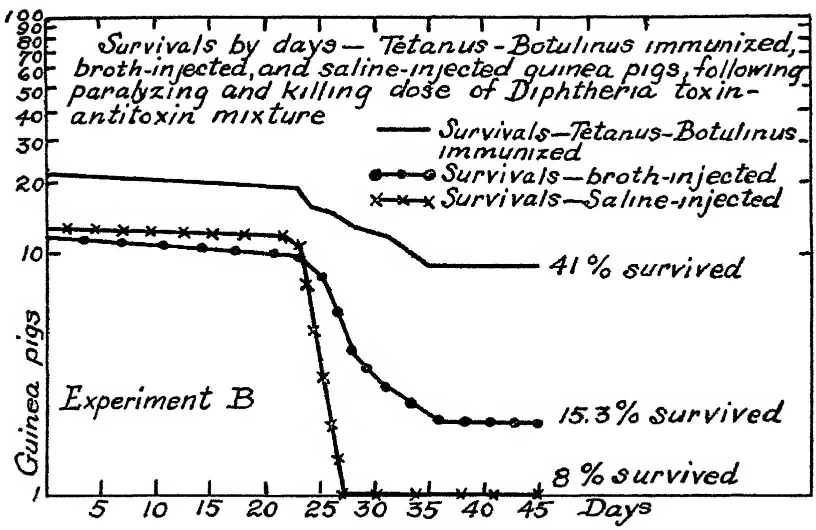

CHART 2

animals had survived, all had shown paralysis, and 10 had died. At the end of the twenty-eighth day, one salt-solution injected guinea pig had survived, all had shown paralysis, and 12 had died. This guinea pig in the salt-solution group surviving with paralysis at the twenty-eighth day did not recover as did the surviving animals in the other groups, but died on the forty-eighth day, 3 days after the termination of the experiment. Chart 2 shows the result of this experiment, the tetanus and botulinus animals being combined in one curve for the sake of simplicity.

Experiment C

This experiment was planned to show the influence upon resistance to diphtheria paralysis induced in guinea pigs by simultaneous immunization to tetanus and botulinus and in guinea pigs immunized to vaccinia.

One hundred and eighty-six animals weighing from 250 to 270 grams were divided into 3 groups. Those in the first group, which contained 98 animals, were injected, subcutaneously, with a mixture of 2 cc of equal parts of tetanus and botulinus toxoid which was repeated after an interval of 18 days. Twenty-eight days after the last injection each surviving animal received 2 MLD's of tetanus and 2 MLD's of botulinus toxin combined as a test for immunity. Those in the second group, 44 animals, were vaccinated on the pad of one hind foot with vaccine virus. This vaccination was done 17 days after the last immunizing injection in the first group in order that the height of the immunity reactions might approximate each other in point of time. The animals of the third group, 44, were injected subcutaneously with 2 cc of normal salt solution on the same dates that the immunizing injections were administered to the first group.

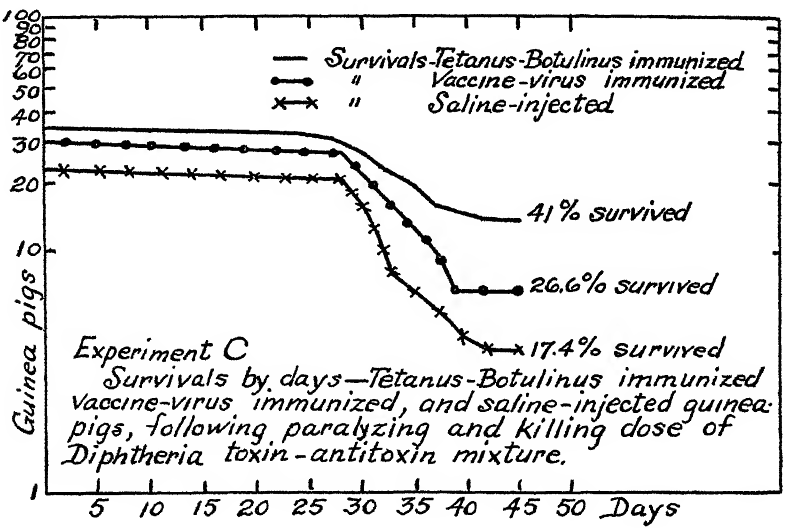

CHART 3

Forty-two days after the last immunizing dose of tetanus-botulinus toxoid and 25 days after the vaccination of the vaccinated group all surviving animals in the three groups were given a paralyzing dose of diphtheria toxin-antitoxin mixture. At the end of 45 days, of 34 tetanus-botulinus immune animals, 14 had survived, 13 with paralysis and 1 without paralysis; 20 had died following paralysis. Of 30 vaccinated animals, 8 had survived with paralysis and 22 had died following paralysis. Of 23 control pigs which had received salt solution, 4 had survived with paralysis and 19 had died following paralysis. The toxin-antitoxin mixture used to inject these groups was from a batch different from that used in experiments A and B, and the dose selected was not strong enough in its paralyzing action to kill all of

the control pigs. The difference in resistance of the different groups is, however, clearly shown (chart 3).

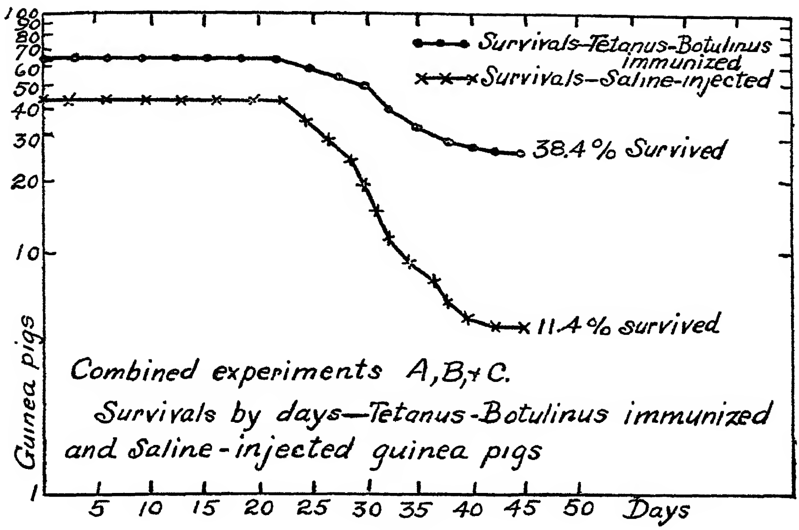

CHART 4

Experiments A, B, and C are combined in chart 4. Curves for animals receiving broth in experiment B and those vaccinated in

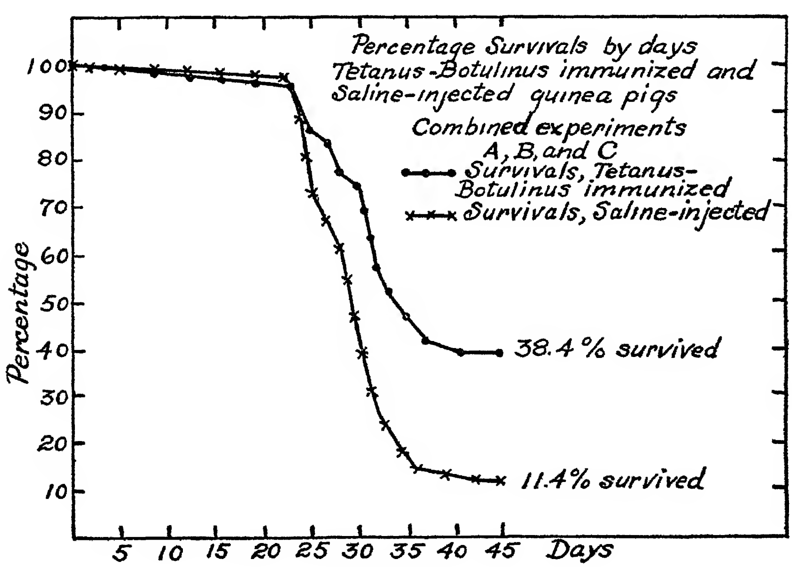

CHART 5

experiment C have been omitted for the sake of simplicity. The same data are shown on a percentage basis in chart 5. All animals in these

experiments were kept under identical conditions as to temperatures, food, and cages. Certain experiments were somewhat handicapped by high mortality from intercurrent infections and the possibility of involuntary selection of more resistant animals has been considered, since during the winter months the percentage of deaths in the groups being immunized was higher than in the control groups. As evidence that such selection was not significant, it was found upon examining figures from experiments done in summer and early autumn, when intercurrent deaths are less frequent, that, disregarding such deaths and basing the percentage of survivals upon the number in each group at the beginning of the experiment, 20 percent of tetanus-botulinus immune groups survived as against 3 percent of the controls. Moreover, paralysis tended to occur earlier in control animals and was more severe than in prepared groups.

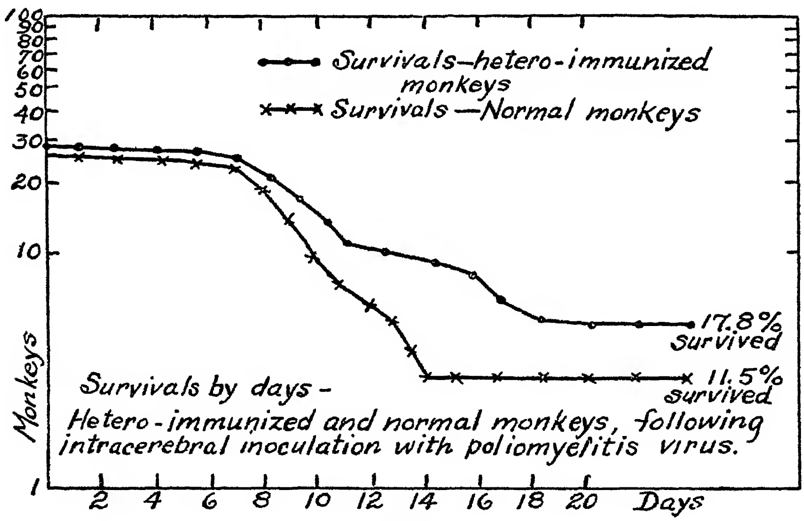

CHART 6

Following the results obtained in heterologous immunization of guinea pigs, experiments were planned to determine whether the same procedure applied to monkeys would influence the course of infection with the virus of poliomyelitis. It was realized that intracerebral inoculation with poliomyelitis virus would constitute a very severe test of slight differences in resistance; therefore the dose was adjusted to as small an amount of virus as could reasonably be expected to bring down the control animals and at the same time not large enough to present an overwhelming infection.

The poliomyelitis virus used in these experiments was Rhoad's P.M. virus and was obtained from Dr. N. Paul Hudson, University of Chicago, in October 1930. This virus is well known for the constancy with which it produces the disease in monkeys. *Macacus rhesus* mon-

keys varying in weight from 3 kg to 4.5 kg were employed. Inoculation was made under intravenous amytal anesthesia, in the right cerebral hemisphere just anterior to the motor area. Virus from the cords of three monkeys was used, sections from different levels being ground in a mortar and suspended in 0.85 percent NaCl solution, the concentration of virus varying from 0.5 to 0.9 percent. The suspension was centrifuged at low speed to remove the sediment, and 0.2 cc of the opalescent supernatant fluid was injected. Test and control animals were alternately inoculated in order that possible deterioration of virus after grinding would not affect the experiment.

Test monkeys were immunized by injection with various antigens, diphtheria toxoid being most constantly used on account of its possible

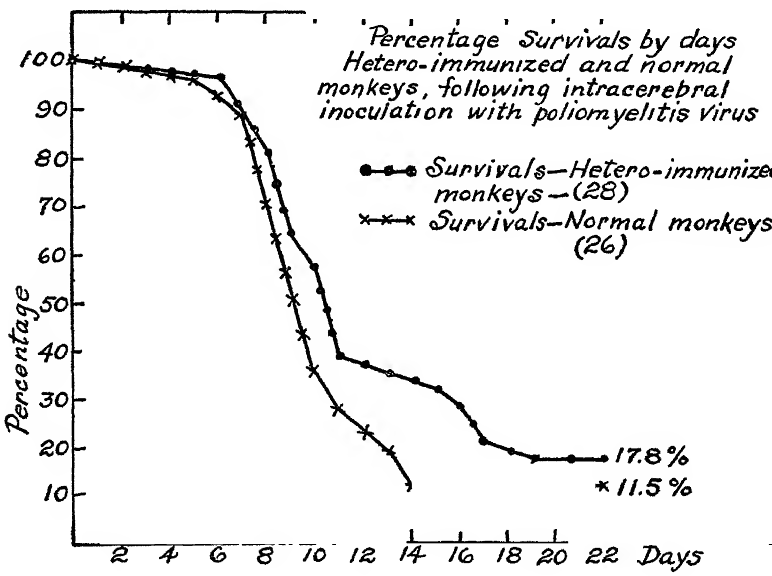

CHART 7

application to public health practice. Tetanus toxoid and vaccine virus were also employed; and in one group, after thorough immunization with diphtheria toxoid, a saline suspension of diphtheria culture was injected. The course of immunization usually extended over a period of 6 to 10 weeks, and the test dose of virus was administered from two to four weeks after the last immunizing dose.

In all, four experiments have been done. In the first experiment, of 7 immunized animals 1 survived after 3 days fever beginning on the eleventh day, and showed slight paralysis of the right shoulder and upper arm. Of six control animals all died.

In the second experiment, of 6 immunized animals all died of the infection, and in 4 controls 1 animal survived with paralysis.

In the third experiment, of 5 immunized animals 2 survived without paralysis, while 1 of 5 controls survived without paralysis.

In the fourth experiment, of 12 immunized animals 2 survived without paralysis, and of 11 controls 1 survived without paralysis.

The results of these four experiments are combined in the curves shown in chart 6. The same data are shown on a percentage basis in chart 7.

Experiment D

In an effort to confirm Klein's findings 48 guinea pigs were divided into 3 groups of 16 pigs each. Group I received 1.5 cc of live typhoid culture suspension intraperitoneally, group II received 1.5 cc of the same suspension subcutaneously, and group III was untreated.

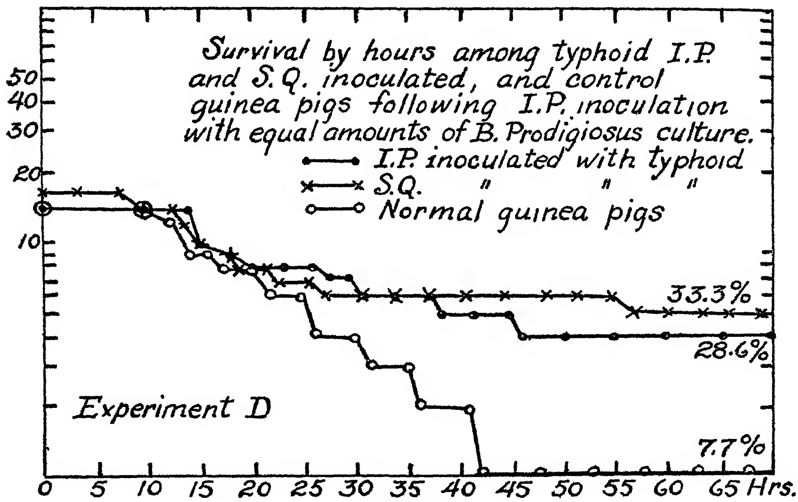

CHART 8

One week following the typhoid inoculations 5 guinea pigs from each of the 3 groups were given 1.3 cc of suspension of live *prodigiosus* bacilli. One from each of the typhoid inoculated groups survived, while all of the controls died.

Two weeks after the typhoid inoculations the remaining animals of each group were given the same dose of *prodigiosus* suspension. As the results were quite similar to those secured after one week, they have been combined. Among 13 animals of group I, 4 survived; among 15 of group II, 5 survived; while among 13 controls only 1 survived. See chart 8.

DISCUSSION

The method by which this increased protection is secured has usually been attributed to a cross-immunity based upon some assumed antigenic relationship between the various substances used in the earlier

and subsequent inoculations. However, the great variety of substances found capable of inducing this increased resistance, together with the failure to find serum antibodies capable of showing passive cross-protection, speak against this view.

In 1919 Love and Davenport commented upon the fact that the incidence of infectious diseases in Army camps recruited from rural areas tended to be higher than was the case in camps recruited from urban populations. These authors fully recognized the part played by specific immunity gained through earlier attacks in reducing the number of later attacks to the usual infectious diseases. They, however, felt that specific protection could hardly account for the lower incidence of such diseases as lobar pneumonia and cerebrospinal meningitis among the troops from urban centers. The authors after discussing several possible explanations state "Another hypothesis is that life in urban communities produces a general resistance to disease of which the observed resistance to measles, mumps, lobar pneumonia, cerebrospinal meningitis, and scarlet fever are only instances."

Clark and his co-workers (1922), commenting upon the observations of Van Valzah relative to the greater incidence of contagion among rural students at the University of Wisconsin as compared to urban students, inquire, "Is there a nonspecific immunity entirely apart from the well-recognized group reactions?" They then suggest, "Through repeated slight injuries to the antibody producing cells should one not expect, on a pathological basis, a hyperplasia of these tissues, an actual extension of the lymphoid tissue or bone marrow for example?" They further suggest that such training of the antibody-producing mechanism should result in a more rapid and greater response in the production of antibodies as a result of a given stimulus.

Armstrong (1932) proposed much the same views, but considered the increased efficiency to be the result of a mobilization, strengthening, and disciplining of the defense tissues due to experience. Thus the defense mechanism is rendered more prompt and effective in its efforts to combat subsequent infections. This conception brings the defense mechanism into line with other better-known tissues wherein functional well-being is so dependent upon judicious exercise.

PRACTICAL APPLICATION

It is admitted that the protection gained through nonspecific experience is only relative and probably of no value in preventing an attack of measles or other highly infectious disease, though it might possibly tend to modify its course. However, the increased resistance might be sufficient to prevent at least some cases of infection with certain diseases possessed of feeble powers of attack, such as post-vaccination encephalitis or poliomyelitis.

SUMMARY

1. Evidence is presented which indicates that exercise of the defense mechanism by inoculation with heterologous antigens increases the resistance of experimental animals to the subsequent action of various infectious agents or toxic substances.

2. It seems probable that this increased resistance occasioned by one antigen or infection is the result of a mobilization, strengthening, and training of the defense mechanism, thus rendering it more prompt and effective in its efforts to combat other subsequent infections.

3. While the increased resistance gained through heterologous experience is only relative, the evidence suggests that it may be sufficient to modify the course of subsequent infections and to be of some value in preventing certain diseases, such as poliomyelitis or post-vaccination encephalitis.

4. In addition to the great protection conferred against diphtheria and smallpox by specific immunization, laboratory evidence indicates that such experiences may be valuable in increasing resistance to various subsequent infections.

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MALARIA IN THE IRRIGATED REGIONS OF NEW MEXICO[1]

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In 1929 the senior writer, with Komp and King (1), reported the results of a survey of malaria made by them in the irrigated regions of the Southwestern United States in 1926, 1927, and 1928. The present paper deals with further work in New Mexico and includes an investigation of the results of certain antimalaria measures begun there three or four years ago. The main object of the more recent undertaking, as of the earlier work, was to estimate the extent of the malaria prob'em in New Mexico and to attempt some definite recommendations as to the best method of dealing with the disease where it had become established and of preventing its further spread.

Malaria is now present in three widely separated regions of the State:

1. *In the valley of the San Juan River, San Juan County, near Farmington.*—Here malaria has but recently appeared. Some six cases were noted in 1931, the history of which indicated that they were the result of local transmission and not relapses of malaria contracted elsewhere. The disease was not known in this locality until the development of certain oil industries brought in a new population, including many persons from regions where malaria is indigenous. The elevation of Farmington is about 5,300 feet above the sea, and the summers are warm. In a survey made there in August 1931 we found numerous *A. maculipennis*, both larvæ and adults, and large areas of swampy meadows suitable for the development of this species. *A. pseudopunctipennis* is also present. In the absence of prompt and vigorous measures, malaria may become as well established and as troublesome there as it is in Rio Arriba County, where climate and species of *Anopheles* are similar.

2. *In the vicinity of Espanola, Rio Grande valley, including portions of Rio Arriba and Santa Fe Counties.*—Here malaria has been indigenous for about 45 years. The elevation is approximately 5,600 feet, and the climate warm from June to September, inclusive. Swampy meadows and ancient beds of the Rio Grande afford abundant breeding places for both *A. maculipennis* and *A. pseudopunctipennis*. In Table 1 are shown the malaria parasite rates of school children, all residing within 15 miles of Espanola. The rates obtained in 1931 are compared with those of previous years. All examinations were made by the same examiner. It will be noted in this table that there has been a decrease in the parasite rate of the region as a whole, a decrease especially marked in San Juan Indian School, where it fell

[1] The studies and observations on which this paper is based were conducted with the support and under the auspices of the International Health Division of the Rockfeller Foundation.

from 28.3 percent in 1926 to 1.3 percent in 1931. On the other hand the rate in San Pedro School has increased and shows for 1931 a very high percentage, 27.3.

TABLE 1.—*Malaria parasite rates of school children in the vicinity of Espanola, New Mexico*

School	1927		1928		1931	
	Number examined	Percent positive	Number examined	Percent positive	Number examined	Percent positive
San Juan Indian [1]	61	13.1	71	11.2	75	1.3
San Juan public [2]					41	2.4
Ranchitos public			17	11.7	11	0.0
Santa Cruz public [2]	65	9.2	77	6.5	78	2.6
Espanola primary [2]	42	0.0			54	3.7
San Pedro public			35	14.3	33	27.3
Alcalde Mission	42	9.5	36	0.0	62	3.2
Velarde Mission	14	21.4	25	4.0	48	6.3
Total	224	9.4	261	8.0	402	5.0

[1] In 1926, 60 examined, 28.3 positive.
[2] Lower grades only examined. In the other schools children of all grades were examined.

3. *Along the Rio Grande in the southern part of the State, throughout Dona Ana County, and in the southern part of Sierra County.*—The elevation at Las Cruces, Dona Ana County, is about 3,800 feet. The summer extends from May to October and is somewhat warmer than in the northern part of the State. *A. maculipennis* and *A. pseudopunctipennis* are present and are mainly produced in drainage ditches and in pools formed by seepage or overflow from irrigation canals.

Malaria in appreciable amount appeared in Dona Ana County in 1926. Its prevalence then and in subsequent years is shown in Table 2, which gives by years the cases reported to the county health officer, Dr. C. W. Gerber (2). These figures indicate a rapid increase between 1926 and 1928 and a subsequent decrease. The decrease, as shown by the case record, is confirmed by our blood parasite surveys of Hill School, Dona Ana County. In 1928 we found 17.9 percent positive among 56 children examined, and in 1931 only 4.4 percent positive among 67 examined.

TABLE 2.—*Cases of malaria reported to the county health office of Dona Ana County, N. Mex. (classification by Dr. C. W. Gerber, county health officer)*

Year	Local new infections [1]	Recurrences	Total	Year	Local new infections [1]	Recurrences	Total
1923	0	2	2	1928	719	216	935
1924	0	3	3	1929	302	176	478
1925	3	4	7	1930	212	166	378
1926	7	20	27	1931 [2]	68	46	114
1927	319	1	320				

[1] Doctor Gerber classifies the infections of the years 1925 to 1929, inclusive, as follows: (a) Malaria contracted previous to coming to Dona Ana County, 43.01 percent; (b) cases contracted in Dona Ana County, 56.84 percent.
[2] Includes all months of 1931 except December.

The three localities in which malaria has appeared have, in common, a high elevation, warm summers, situation in irrigated river valleys, and the presence of *A. maculipennis*. Benign tertian (*P. vivax*) is everywhere the prevalent species of malaria parasite. Estivo-autumnal (*P. falciparum*) appeared in considerable amount in one restricted locality in Dona Ana County during 1927. With that exception, practically no species other than benign tertian has appeared among the hundreds of cases confirmed by blood examination.

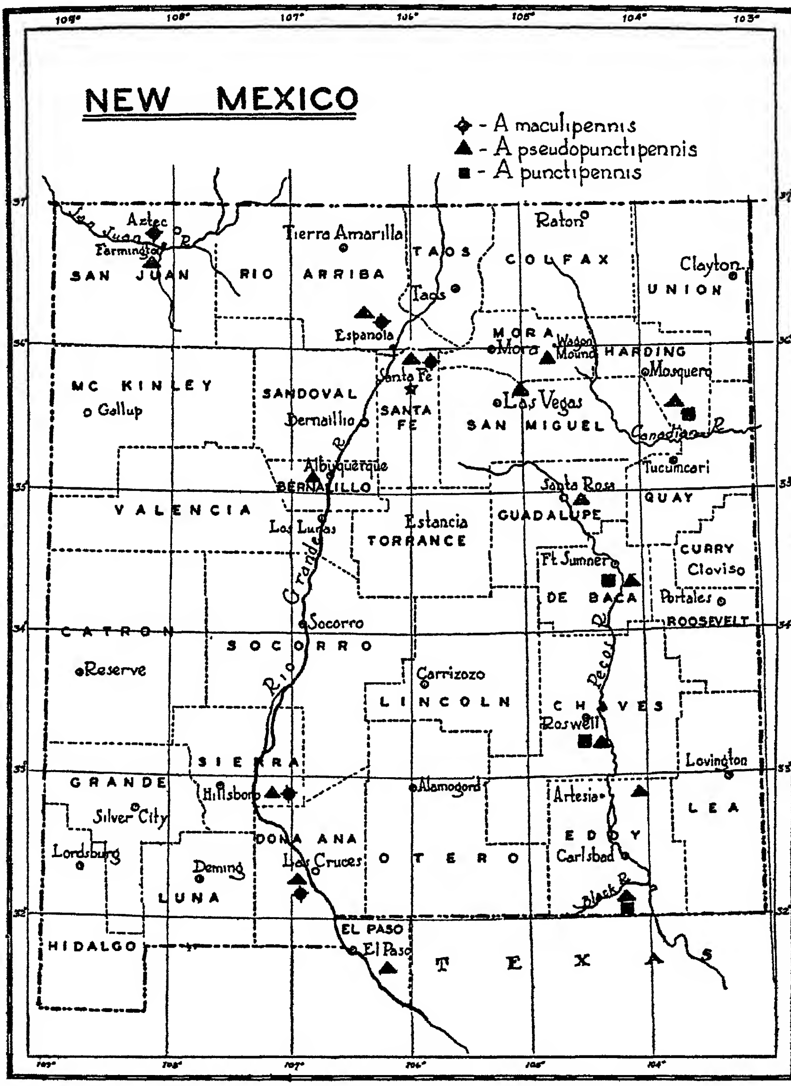
There are localities, at present malaria free, which are quite as favorable for the transmission of the disease as the three previously mentioned, and probably lack only suitable gametocyte carriers to infect mosquitoes. Land along the Rio Grande, especially in the central part of the State, is now being reclaimed from alkali by large drainage ditches; these, when overgrown by aquatic vegetation, are likely to become suitable breeding places for *Anopheles* and perhaps new centers of malaria. Malaria may show a high degree of intensity in New Mexico and, once established, may be very difficult to eradicate. The problem in that State, then, is not a negligible one; and the presence of the disease there is the more to be deplored, since the State is a favored resort of health seekers.

ANOPHELES

The distribution of anopheline species.—The accompanying map shows the distribution of anopheline species in New Mexico. The data are based on our surveys and, since they represent the investigations of only three years, are necessarily incomplete. We examined many hundreds of larvæ as well as adult mosquitoes, but the final determination of species rests chiefly on adult characteristics. We have found only three species in New Mexico, *A. maculipennis*, *A. pseudopunctipennis*, and *A. punctipennis*.

It will be seen on the map that *A. pseudopunctipennis* is widely distributed in the State. It probably occurs wherever suitable water for breeding is present. *A. maculipennis* occurs in the valleys of the San Juan River and the Rio Grande. We have not found this species in the Pecos Valley, although we have made three surveys there (one in 1928 and two in 1931), in the course of which we collected many hundreds of adult anophelines of other species. We have found *A. punctipennis* only in the Pecos Valley. It is very plentiful in the southern part of Eddy County (especially along the Black River), less common northward, but present as far north as the valley of the Canadian River. It breeds in much the same waters as those preferred by *A. maculipennis* in the Rio Grande Valley. It is quite possible that *A. maculipennis* will at some time be found in the Pecos Valley, but if present it must be rare. *A. quadrimaculatus* is present in the lower Rio Grande Valley of Texas and may extend into New

Mexico, but we have been unable to prove that any occurs there. One could easily overlook specimens of *A. quadrimaculatus* in a collection containing *A. maculipennis*, since the adult characteristics of the two species are somewhat similar.



Distribution of Anopheles species in New Mexico

We are unable to explain why *A. maculipennis* should prefer the valley of the Rio Grande and *A. punctipennis* that of the Pecos. The elevation of the Pecos Valley is much less where it passes the southern boundary of New Mexico than is that of the Rio Grande; but both

valleys rise to 6,000 feet or over in the north. The alkalinity of the waters of the Pecos Valley is generally greater than that of the Rio Grande, but both valleys have waters exhibiting great variations in alkalinity, and this factor would hardly suffice to account for a general difference in the species. It is possible that we have to do with mere geographical distribution of species *A. punctipennis* is plentiful at Del Rio, Tex., which is situated on the Rio Grande near the base of the Pecos Valley, and may have spread upwards in one valley and not in the other. A wide expanse of desert and mountains separates the two valleys in both Texas and New Mexico.

We have made two surveys, in 1928 and 1931, in the portion of El Paso County, Tex., situated in the Rio Grande Valley below the city of El Paso. In both surveys we found *A. pseudopunctipennis* more or less plentiful but never *A. maculipennis*. Water apparently favorable for the development of the latter species occurs there; but we could find no adults or larvæ, although these occur a few miles north of El Paso. Differences in elevation, character of water, and temperature of the river valley above and below El Paso are not great, but it may be that the city marks the southern limit of *A. maculipennis*, at least of its occurrence in large numbers. The health authorities of El Paso County state that the transmission of malaria has not been noted south of El Paso.

Incidence of species.—The percentage incidence of *A. psuedopunctipennis* and *A. maculipennis* in two regions of New Mexico, the vicinity of Espanola in the north and that of Las Cruces in the south, is shown in Table 3.

TABLE 3.—*The percentage incidence of adult Anopheles in two regions of the Rio Grande Valley of New Mexico*

Locality	Year	Number of adults identified	Percentage incidence of—	
			A maculipennis	A pseudopunctipennis
Espanola	1927	3,700	77	23
	1928	3,800	80	20
	1931	1,592	82	18
Las Cruces	1928	5,500	33	67
	1931	1,638	11	89

It is seen in Table 3 that the incidence of *A. maculipennis* is much higher in the more northerly region. It was fairly constant during three years. In the south the percentage of *A. maculipennis* was much lower in 1931 than in 1928, probably as the result of antilarval measures undertaken there.

The collections shown in Table 3 were made during the warmer part of the year, for the most part in July, August, and early September. In 1931 we made some collections near Espanola about the middle of October after sharp frosts had begun. In six collections, consisting of three trips to two different outdoor localities, we found only *A.*

maculipennis, although *A. pseudopunctipennis* had been common in both localities during the summer. The total of the October collections was 116 *A. maculipennis*, of which 68.9 percent were females, a slightly higher percentage of females than that furnished by outdoor midsummer collections in the same locality (55.4 percent). Larvae and pupae of *A. maculipennis* were still plentiful in mid-October.

Breeding waters of Anopheles.—In northern New Mexico we can distinguish two extreme types among anopheline breeding waters: (1) those almost completely shaded and containing water cool at all times of the day; (2) those wholly exposed to the sun and filled with aquatic vegetation, thick and extending just to the surface of the water. In the first, *A. maculipennis* is usually the only species found; in the second, *A. pseudopunctipennis* is usually in "pure culture." Between these two extremes of sun exposure the larvae of both species are often found together. Daytime temperature seems to be the determining factor, although cold springs far up in the mountains may contain *A. pseudopunctipennis* if exposed to the sun.

In southern New Mexico also *A. maculipennis* is the species most commonly found in well-shaded waters, and *A. pseudopunctipennis* in the open; but *A. pseudopunctipennis* has a wider range than in the north, and the output of adults is greater than that of *A. maculipennis* (Table 3). *A. punctipennis* in eastern New Mexico breeds in about the same kind of water as does *A. maculipennis* in the Rio Grande valley, but also occurs in river pools more or less exposed to the sun.

A type of breeding place of much sanitary importance in southern New Mexico is formed by the seepage or overflow of water from irrigation canals to borrow pits or lower ground along the canals. These waters become overgrown with grass, reeds, or willows and form excellent breeding places for *A. maculipennis*, the more productive since usually free from larva-eating fish.

Habits of adult Anopheles with reference to human dwellings.—In Dona Ana County we collected inside dwellings 226 adult mosquitoes, of which 52.2 percent were *A. maculipennis* and the remainder *A. pseudopunctipennis;* but of 1,412 collected outdoors only 4.2 percent were *A. maculipennis*. Of the *A. maculipennis* collected within dwellings in the same locality, only 0.8 percent were males, while of those collected outdoors 61.6 percent were males. The percentage of males among adult *A. pseudopunctipennis* was about the same whether collected indoors or not (63 percent and 68 percent, respectively). In a collection of 730 *A. maculipennis* collected indoors in another locality (vicinity of Espanola), 13.7 percent were males; and of 572 collected outdoors, 44.6 were males. Here also the percentage of males among *A. pseudopunctipennis* was about the same whether collected indoors or not. The breeding places of the two species at Espanola were about equidistant from the houses in which the collec-

tions were made. According to our observations generally, the percentage of females among *Anopheles* in daytime resting places is higher where mosquitoes enter buildings in search of blood than where they enter for purposes of shelter only.

Among adults collected indoors a much higher percentage of *A. maculipennis* than of *A. pseudopunctipennis* were found blood-engorged. For example, among 393 *A. maculipennis* collected in houses near Espanola, 88.5 percent were blood-engorged; while among 39 *A. pseudopunctipennis* also found indoors, only 38.5 percent contained blood. Collections of the two species made in Dona Ana County showed much the same conditions of blood-engorgement.

On the whole, it appeared that *A. maculipennis* enter human dwellings in search of blood, while *A. pseudopunctipennis* seek dwellings as they would any other shelter.

Some curious examples of variation in the house-seeking habits of *A. pseudopunctipennis* occurred. We made almost daily visits to two houses about one-quarter of a mile apart and almost equidistant from the breeding places of *A. pseudopunctipennis* and *A. maculipennis*. The proportion of *A. pseudopunctipennis* in one house was only 2.3 percent, while in the other it was over 30.0 percent. The latter house was nearer the stables than the former. In another locality one of a group of houses (Muñoz) contained only *A. maculipennis* while the house was occupied. When the family moved out, leaving the house vacant, *A. pseudopunctipennis* became the dominant species. In a house immediately adjoining and continuously occupied *A. maculipennis* continued to be almost the only species found. It may be that *A. pseudopunctipennis* is repelled by some domestic odor, possibly smoke, to a greater degree than is *A. maculipennis*.

Susceptibility to malaria parasites; sporozoite and oocyst rates.—In 1931 we made dissections of *A. maculipennis* and of *A. pseudopunctipennis* collected in two regions, the vicinity of Espanola, northern New Mexico, and Dona Ana County, in the south. The results appear in Table 4.

TABLE 4.—*Oocyst and sporozoite rates of A. maculipennis and A. pseudopunctipennis collected in New Mexico, 1931*

Species and place of collection	Oocysts in the stomach			Sporozoites in the salivary glands		
	Number examined	Number positive	Percent positive	Number examined	Number positive	Percent positive
A. maculipennis						
Within dwellings	201	6	2.9	705	6	0.9
Outside of dwellings	53	0	0.0	156	0	0.0
Total	254	6	2.4	861	6	0.7
A. pseudopunctipennis						
Within dwellings	77	0	0.0	99	0	0.0
Outside of dwellings	80	0	0.0	158	0	0.0
Total	157	0	0.0	257	0	0.0

The total percentage positive, whether of stomachs or salivary glands, were as follows: *A. maculipennis*, 868 examined, 1.4 percent positive; *A. pseudopunctipennis*, 263 examined, none positive. Specimens positive for sporozoites occured in both northern and southern regions. In both localities, however, the actual percentage positive of *A. maculipennis* would be below that shown in Table 4, for we not only collected the majority of the specimens described in that table from human dwellings, but made repeated collections in houses most likely to furnish positives. However, our results show that malaria-infected *A. maculipennis* occurs in nature in two widely separated localities and in numbers sufficient to be of sanitary significance. The best comparison of the infection rates of *A. maculipennis* and *A. pseudopunctipennis* is afforded by collections of the two species made in the same houses and at a time when one or the other species showed some positives, that is, when an effective gametocyte carrier was present or had recently been present in the neighborhood. Satisfying these conditions we have in our series, *A. maculipennis* 331, with 3.3 percent positive, and *A. pseudopunctipennis* 51, with no positives.

We describe in more detail one incident which may illustrate the general course of events concerned in the transmission of malaria in northern New Mexico, that of a house (Bustos) in which a number of persons slept in an unscreened room. We made nine daily collections (September 22 to September 30) in this room. The number of female *A. maculipennis* collected varied from 14 to 73 daily, with no tendency to diminution as the catches continued. Specimens positive for malaria parasites were found on the first day and appeared occasionally up to the eighth day, at first showing only oocysts, later only sporozoites. We examined blood specimens of the family occupying the house and found one boy 10 years old with numerous benign tertian parasites but no gametocytes. He had no recent history of illness. No other member of the family was then positive. At the time when we were finding positive *A. maculipennis* in the Bustos house we also made collections in another unscreened house about a quarter of a mile away. Among 232 *A. maculipennis* taken in the second house and dissected, not one positive specimen was found.

About five days after the collections from the Bustos house had been discontinued we examined blood specimens of children in the local school. Among the positives was a child of the Bustos family who had not been positive at the time when the blood specimens of the family were examined.

It appears from this series of observations that *Anopheles* were being infected by a carrier in ordinary health and that, later, malaria was transmitted to another member of the family. Large numbers of *A. maculipennis* must have entered the unscreened room and bitten this carrier. Of the positive specimens collected in the Bustos house

(eight in all), nearly all had sporozoites in the salivary glands or nearly mature oocysts in the stomach, so they must have been infected almost two weeks previously. It seems probable, then, that the infected *Anopheles* spent part of the time outdoors, else they would all have been caught during the first few days. But few, if any, of them strayed as far as the second house, one-quarter of a mile away.

About a quarter of a mile from the Bustos house, a pasture continually flooded with irrigation water furnished a highly productive breeding place of *Anopheles*. The owner of the Bustos house said he was going to put in a screen door "next year."

On the whole, the evidence we obtained in 1931 tends to confirm the conclusion of previous years, that *A. maculipennis* is the chief carrier of malaria in New Mexico. The epidemiological evidence is not decisive: we have in the State malaria-free localities which contain *A. maculipennis*, as well as those which contain only *A. pseudopunctipennis;* but in a general way *A. maculipennis* and endemic malaria coincide. The house-visiting habits of *A. maculipennis* and, above all, its infection with sporozoites prove that it is a carrier in New Mexico. *A. pseudopunctipennis* is a known vector of malaria in South America and *A. punctipennis* a proved carrier in the laboratory, so that neither species can be exonerated; but it is probable that in New Mexico neither is as dangerous as *A. maculipennis*, if they are vectors at all. Hermes and his colleagues in California regard *A. maculipennis* as the chief carrier of malaria in that State.

ANTIMALARIA MEASURES

Drainage.—As an antilarval measure, drainage has limited value in an irrigated region. Indeed, the drainage ditches constructed to prevent water-logging of the soil are the chief producers of *Anopheles* in southern New Mexico. In some localities wet pastures formed by turning irrigation or spring water over fields constitute a most prolific source of *Anopheles*. Here ditching may be of much value in preventing mosquito breeding without materially interfering with agriculture, since it may allow of intermittent instead of continuous irrigation of the land. A good example of wet pasture breeding is found in the San Pedro neighborhood (Table 1), where a single ditch would greatly diminish the production of *A. maculipennis* in a community severely plagued by malaria. Some ditches were made by Mr. W. H. W. Komp, of the United States Public Health Service, in 1928 near the San Juan Indian pueblo. These were not properly maintained by the local authorities, and their value has not been permanent. The Indians have clogged the ditches by roads, and the beavers by building dams across them.

Larvicides.—The use of Paris green in New Mexico was discussed in a previous paper (1). It is certainly effective in drainage ditches,

where the use of oil is hardly practicable. But it is difficult to cope with rural malaria by larvicides alone in a region where breeding places are so abundant One county may have nearly 250 miles of drainage ditches, as well as innumerable pools; and it is no small matter to treat and inspect all of these adequately. It is probable that larvicides are best limited to local or temporary control of anopheline breeding. Dr. C. W. Gerber, health officer of Dona Ana County, has employed larvicides for several years. There has been a marked reduction of *Anopheles* in the county, especially of *A. maculipennis*. *Gambusia* have also been introduced, but it is only fair to ascribe a considerable portion of the reduction in *Anopheles* to larvicides.

Gambusia.—This minnow is apparently not indigenous to New Mexico. It was introduced into El Paso County, Tex., by R. E. Tarbett, of the United States Public Health Service, in 1921 or 1922. From there it spread up the Rio Grande as far as Vado, N.Mex. In 1927 we imported it from Mississippi into Rio Arriba County, northern New Mexico, and into Dona Ana County in the south. Doctor Gerber has distributed it in Dona Ana County, and we have spread it widely along the upper Rio Grande Valley near Espanola and into San Juan County. It thrives well in New Mexico, becoming very numerous in favorable waters, but never to the extent of constituting a nuisance. Once introduced it will spread widely without artificial aid through waters lying at about the same level, but it seems to have difficulty in ascending an abrupt rise of a few feet. Further, there are important breeding places, such as those formed by seepage from irrigation ditches, which become dry during a part of the year. In others, fish may be killed out by freezing. It is necessary, therefore, to make occasional inspections and to redistribute the minnows where needful.

As to the efficiency of this minnow in New Mexico there seems to be little doubt. We made careful surveys of a series of breeding places along the Rio Grande in 1927 and again in 1931 after *Gambusia* had become well established. Some breeding persisted, of course, especially in thick mats of horizontal aquatic vegetation; but the total amount of breeding, especially that of *A. maculipennis*, had materially diminished. A prolific breeding place of *A. maculipennis* is afforded by grass or reeds hanging into water at the sides of drainage ditches. These grassy margins seem quite accessible to *Gambusia*, and in *Gambusia*-stocked ditches they contain but few larvae, while in unstocked ditches they may contain many larvae. We made some careful comparisons of this type of breeding place in southern New Mexico before and after *Gambusia* had become established; and in 1931 we compared the drainage ditches of Dona Ana County, where

Gambusia is plentiful, with those of the Pecos Valley, where the minnows had not yet been introduced.

The malaria parasite rate of certain localities in northern New Mexico has fallen since the establishment of *Gambusia* in them, notably in the neighborhoods represented by San Juan and Ranchitos schools (Table 1), where *Gambusia* has been longest present and most thoroughly distributed. With regard to the decrease in malaria at San Juan, the evidence of the parasite rates is supported by the testimony of the physician in charge of the pueblo and by that of the resident nurse, and also by that very convenient malariometer, the sale of chill tonics, which has materially decreased. Adult *A. maculipennis* have become few in the houses of the neighborhood. In the San Pedro neighborhood, where the malaria rate is high and increasing, the chief breeding place is above the level of the river, and *Gambusia* has not yet become established there. Adult *A. maculipennis* is very plentiful in the neighborhood.

In Dona Ana County, southern New Mexico, a marked reduction in the prevalence of *Anopheles*, especially of *A. maculipennis* (Table 2), has occurred during the past three years. Larvicides have undoubtedly contributed much to this reduction; but some credit should be given to *Gambusia*. In pools formed by seepage from irrigation canals and inaccessible to *Gambusia*, breeding has diminished less than in the drainage ditches, which have become well populated with minnows. Further, in the portion of El Paso County, Tex., which lies below El Paso, *A. pseudopunctipennis* has diminished and *A. maculipennis* is rare or lacking. There *Gambusia* is well distributed, but no larvicides have been used in the drainage ditches. The reduction of malaria in Dona Ana County is shown in Table 2. The diminution of *Anopheles*, however, is not the only factor which has contributed to this reduction in malaria. The county health officer, Doctor Gerber, has treated carriers with quinine and plasmochin and has encouraged people to repair defective screens and to call in a doctor when ill.

Screening.—The screening of dwellings is much more general in the Rio Grande Valley than in the eastern part of Southern United States. Approximately 90 percent of the houses in Dona Ana County are screened, but good screening is less general in the northern part of the State. We made a survey of the condition of screens in the San Pedro neighborhood near Espanola, a locality where malaria is now very prevalent (parasite rate of school children over 27 percent) and has apparently been increasing. Sixty-one houses, nearly every one in a small isolated neighborhood, were surveyed. Four were wholly unscreened. Of the 57 with more or less screening, about 10 had screened doors and the windows screened to the top, with all screens in good condition. Twelve had only the doors screened. Six had

screened verandas. With regard to the condition of the screening, we classified 17 as good, 22 as fair, and 14 as poor.

In our examination of blood specimens of school children of this neighborhood, we found eight families infected. None of these lived in the unscreened houses; three were in houses which could be classified as well-screened, and the other five in houses poorly screened. An unscreened or very poorly screened house may be of much danger to a neighborhood, and it may be that some of the cases which occurred in the well-screened houses owed their infection to mosquitoes coming from houses of the Bustos type (see description above).

It appears from our observations in New Mexico that the mere installation of screens in a region is not sufficient, even though a very large percentage of the houses are screened. The screens must be kept in order and the people taught to use them properly. Poor or partial screening may have some value, but it is not sufficient to prevent an increase and high prevalence of malaria.

Educational work.—Education in health matters is especially needed in some parts of New Mexico. Many of the people seem to have little knowledge regarding the means by which ordinary diseases are transmitted and are often slow to call in a physician when seriously ill. A health officer in a northern county told us that many of the Spanish Americans there would not call in a doctor until they had sufficient money in pocket to pay the bill. As a result, severe cases of contagious diseases might not be reported until after people in contact with the patient had been endangered for days. It would seem that a very little education would suffice to cure that type of neglect. But people, even those well-to-do, are prone to neglect malaria, and education may help to convince them of their duty to the public in this matter. Education should be centered on the following: The method by which malaria is transmitted; the avoidance of improper spread of irrigation water; the careful use of screens; and the necessity of adequate treatment when ill.

Domestic animals.—The domestic animals pasture in the open during most of the summer and are not very snugly housed during the winter. We saw but one really tight barn in northern New Mexico. Conditions throughout the State are not particularly favorable for the deviation of *Anopheles* to domestic animals.

Other possible antimalaria factors.—Among minor factors of known or reputed value in the prevention of mosquito breeding several may be mentioned:

Alfalfa and sweet clover are common in New Mexico but apparently offer no hindrance to the spread of malaria.

Chara is very abundant; but larvæ of both *A. maculipennis* and *A. pseudopunctipennis* grow well in its presence. Anopheline larvae are often found in water nearly filled with this plant.

Duckweed grows thickly enough in certain pools to offer some hindrance to the growth of larvæ, but is apparently unable to flourish in the majority of breeding waters.

Bats are abundant along the Black River in southeastern New Mexico. We saw large numbers of them pursuing insects at night in a locality about 15 miles from the Carlsbad Caverns, which are said to harbor three million bats. But adult *A. punctipennis* and *A. pseudopunctipennis* are present by the hundreds in daytime resting places along the Black River, and the waters of this stream swarm with anopheline larvae.

Summary of antimalaria measures.—The measures especially suitable for the prevention and cure of malaria in New Mexico may be summarized as follows:

1. Distribution of *Gambusia*.
2. Prevention of improper use of irrigation water.
3. Treatment of malaria cases, preferably through the cooperation of physicians.
4. Education regarding the way malaria is transmitted, and the necessity for adequate treatment of the disease and the proper use of screens.
5. Larvicides for local or temporary use.

In localities in which no malaria has appeared, the only antilarval measure which may be indicated is the distribution of *Gambusia*. These minnows may now be obtained in New Mexico from counties in which they are established. Information in regard to places where they may be obtained may be had from the Director of Public Health at Santa Fe. It is easy to transport the minnows in five-gallon gasoline cans. They should first be placed in permanent waters with shallow margins, preferably those fed by springs, since these are less likely to dry up or to freeze during the winter. When they have become numerous they may be scooped up in a sieve or fine net and distributed to all waters in the locality. If the identity of a species of minnow is in doubt, information may be obtained by sending samples in formalin to the Bureau of Fisheries, Washington, D.C.

In localities where malaria has become established, more thorough methods may be necessary. *Gambusia* should be introduced if not already present, and redistributed every spring or as often as is necessary to keep all waters well stocked. Special attention should be paid to borrow pits or other temporary water collections formed by seepage or overflow from irrigation canals. Treatment of carriers should be looked after. Education should be promoted in schools and elsewhere to teach people the way malaria is transmitted, the necessity for adequate treatment, and the maintenance and proper use of screens. Larvicides may be necessary to do away with a mosquito nuisance or for local or temporary protection against malaria, but it is

doubtful whether they can be profitably used year after year on a country-wide basis. The free and general distribution of quinine, except possibly in an emergency, is likewise a measure of doubtful practicability. Any permanent procedure which may interfere with the cooperation of the physicans is of questionable value.

We believe that the spread of *Gambusia* has been of material assistance in the reduction of malaria in New Mexico and should not be omitted from any antimalaria plan. The treatment of the sick and educational work also rank high among antimalaria measures and are within the means of most health authorities. None of the measures recommended here requires a large additional outlay of funds in the case of counties already provided with a health officer and visiting nurses.

SUMMARY

1. Malaria is now present in New Mexico in at least three widely separated regions. Once established, it may persist in a region for many years.

2. Of the three species of *Anopheles* common in New Mexico, *A. maculipennis*, *A. pseudopunctipennis*, and *A. punctipennis*, the first is certainly a carrier of malaria there and may be the only one of importance. It is common in the valleys of the Rio Grande and the San Juan River, but is rare or lacking in the Pecos Valley. *A. punctipennis* is commonest in southeastern New Mexico; *A. pseudopunctipennis* is present everywhere in the State.

3. Of the preventive and curative measures applicable in New Mexico, the spread of *Gambusia*, treatment of carriers, and education regarding the necessity of treatment and proper use of screens seem the most promising.

REFERENCES

(1) Barber, M. A , Komp, W. H. W., and King, C. H.: Malaria and the malaria danger in certain irrigated regions of the Southwestern United States. Pub. Health Rep , vol. 44, no 22, pp. 1300-1315, May 31, 1929.

(2) Gerber, C. W.: Summary of malaria control work in Dona Ana County, N.Mex. Southwestern Medicine, vol. 15, no. 8, p. 370, August, 1931.

COURT DECISION RELATING TO PUBLIC HEALTH

Provision of borough ordinance as to burial permit held abrogated by State vital statistics law.—(Pennsylvania Superior Court; Borough of Yeadon *v.* Galen, 164 A. 837; decided Mar. 3, 1933.) An ordinance of the borough of Yeadon, enacted in 1895, provided that no dead body should be brought into the borough for burial without giving certain specified information to the secretary of the borough board of health and also obtaining a burial permit, the fee for which was $1.

The State vital statistics statute of 1915 provided that the body of a person dying in the State should not be interred until a permit for burial, removal, or other disposition had been issued by the local registrar of the registration district in which the death occurred. With reference to the removal of a body from one district to another in the State, such act provided:

But a burial permit shall not be required from the local registrar of the district in which interment is to be made when a body is removed from one district in Pennsylvania to another district in the State for purpose of burial or other disposition, either by common carrier, hearse, or other conveyance, and no local registrar shall, as such, require from undertakers, or persons acting as undertakers, any fee for the privilege of burying dead bodies.

The defendant, an undertaker, secured a burial or removal permit from the registrar for Philadelphia county in connection with the death of a person in the city of Philadelphia. He arranged for the interment of the body in a cemetery in the borough of Yeadon. He exhibited the permit he had obtained to the secretary of the borough board of health but did not secure a permit or pay the $1 fee as provided by the above mentioned borough ordinance. The body was interred in the borough and thereafter an action was brought for the violation of the ordinance. The defendant was convicted and he appealed to the superior court. That court took the view that the conviction of the defendant could not be sustained. saying, in part, as follows:

* * * the act of 1915 provides, as we have shown, that a second permit and the payment of an additional fee shall not be required.

* * * The title and the substance of the act of 1915 evinces an intention on the part of the legislature to provide not only vital statistics but also a general system throughout the commonwealth for issuing burial permits in conjunction with other legislation for the protection of the public health, and, incidentally, that unnecessary permits and expense be avoided.

The act of May 4, 1927, P.L. 519, section 2801 (53 PS, section 15021) is derived from and now supplies the act of 1851 to which we have referred and provides as follows: "Boroughs may prohibit within their limits or within any described territory within such limits the burial or interment of deceased persons and may regulate the depth of graves." The construction which we have placed upon the act of 1915 allows the section of the borough code to which we have referred and the provisions of the act of 1915 to stand but abrogates and nullifies that provision of the ordinance in question which would have required of the defendant a permit from the secretary of the board of health of the borough and the payment of a fee. The conviction of the defendant cannot be sustained.

PUBLIC HEALTH SERVICE PUBLICATIONS

A List of Publications Issued During the Period July–December 1932

There is printed herewith a list of publications of the United States Public Health Service issued during the period July–December 1932.

The most important articles that appear each week in the PUBLIC HEALTH REPORTS are reprinted in pamphlet form, making possible a wider and more economical distribution of information that is of especial value and interest to public-health workers and the general public.

All of the publications listed below except those marked with an asterisk (*) are available for free distribution and as long as the supply lasts may be obtained by addressing the Surgeon General, United States Public Health Service, Washington, D.C. Those publications marked with an asterisk are not available for free distribution but may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D.C., *at the prices noted.* (No remittances should be sent to the Public Health Service.)

Periodicals

Public Health Reports (weekly), July–December, vol. 47, nos. 27–53, pages 1419 to 2394.

Venereal Disease Information (monthly), July–December, vol. XIII, nos. 7–12, pages 253 to 412. (Annual index in December issue.)

Reprints from the Public Health Reports

*1539. Epidemic of mild dysentery-l ke disease in Cattaraugus County, N.Y., summer of 1930. By Dorothy G. Wiehl and Mary Gover. July 1, 1932. 8 pages. 5 cents.

1540. Observations on the agglutination of Proteus X organisms in Rocky Mountain spotted fever. By Gordon E. Davis and R. R. Parker. July 15, 1932. 12 pages.

1541. Postvaccination encephalitis with special reference to prevention. By Charles Armstrong. July 22, 1932. 16 pages.

1542. Report of Committee on Milk. Conference of State and Provincial health authorities, June 2, 1932. August 12, 1932. 4 pages.

1543. The metamorphoses of streptococci into spore-bearing rods and into filterable forms. By Alice C. Evans. August 19, 1932. 16 pages.

1544. Relation of oxidation to proteolysis in malignant tumors. By Carl Voegtlin and Mary E. Maver. March 25, 1932. 16 pages.

1545. The incidence and time distribution of common colds in several groups kept under continuous observation. By W. H. Frost and Mary Gover. September 2, 1932. 27 pages.

1546. Studies on immunity induced by mouse sarcoma 180. By H. B. Andervont. September 9, 1932. 19 pages.

*1547. Biological products. Establishments licensed for the propagation and sale of viruses, serums, toxins, and analogous products. September 9, 1932. 6 pages. 5 cents.

1548. Etiology of trachoma with reference to relationship of Bacterium granulosis (Noguchi) to the disease. By Ida A. Bengtson. September 16, 1932. 22 pages.

*1549. Do children who drink raw milk thrive better than children who drink heated milk? By Leslie C. Frank, F. A. Clark, W. H. Haskell, M. M. Miller, F. J. Moss, and R. C. Thomas. September 23, 1932. 10 pages. 5 cents.

*1550. Public health education. The functions of the university and of the private foundation. By John Sundwall. October 7, 1932. 16 pages. 5 cents.

*1551. An epidemic of motor neuritis in Cincinnati, Ohio, due to drinking adulterated Jamaica ginger. History, symptomatology, and clinical report. By Charles E. Kiely, Murray L. Rich, A. R. Vonderahe, T. J. LeBlanc, and W. E. Brown. October 14, 1932. 25 pages. 5 cents.

1552. Public Health Service publications. A list of publications issued during the period January–June, 1932. October 21, 1932. 2 pages.

*1553. Excess mortality from causes other than influenza and pneumonia during influenza epidemics. By Selwyn D. Collins. November 11, 1932. 21 pages. 5 cents.

*1554. Plasmochin in malaria prevention. Experiments in Alabama. By J. N. Baker and D. G. Gill. December 2, 1932. 6 pages. 5 cents.

*1555. Recent court decisions on milk control. By James A. Tobey. December 2, 1932. 8 pages. 5 cents.

*1556. Standardization of morbidity reporting and development of the morbidity reporting area. By R. C. Williams. December 9, 1932. 16 pages. 5 cents.

*1557. Rocky Mountain spotted fever (eastern type). Virus recovered from the dog tick Dermacentor variabilis found in nature. By L. F. Badger. December 30, 1932. 5 pages. 5 cents.

*1558. Endemic typhus fever virus recovered from wild rat trapped at typhus focus in the United States. By R. E. Dyer, W. G. Workman, and A. Rumreich. December 30, 1932. 5 pages. 5 cents.

Supplements to the Public Health Reports

*103. Chemistry of the opium alkaloids. By Lyndon F. Small assisted by Robert E. Lutz. 1932. 375 pages. $1.00.

*104. The notifiable diseases. Prevalence during 1930 in States. 1932. 10 pages. 5 cents.

*105. The notifiable diseases. Prevalence during 1931 in States. 1932. 14 pages. 5 cents.

Public Health Bulletins

*202. Frequency of pneumonia among iron and steel workers. By Dean K. Brundage, Albert E. Russell, Roy R. Jones, J. J. Bloomfield, and Lewis R. Thompson. November 1932. 51 pages. 5 cents.

*203. A study of the pollution and natural purification of the upper Mississippi River. Surveys and laboratory studies. By H. R. Crohurst. December 1932. 113 pages. 10 cents.

National Institute of Health Bulletin

*160. Further studies on the pharmacology of certain phenol esters with special reference to the relation of chemical constitution and physiologic action. By Maurice I. Smith, E. W. Engel, and E. F. Stohlman. The histopathology of some neurotoxic phenol esters. By R. D. Lillie and Maurice I. Smith. August 1932. 69 pages. 10 cents.

Unnumbered Publication

*Index to Public Health Reports, vol. 47, part 1 (January–June 1932). 23 pages. Out of print.

Reprints from Venereal Disease Information

40. The British treatment center. By R. A. Vonderlehr. From Venereal Disease Information, vol. XII, no. 12. 4 pages.
41. Cooperative clinical studies in the treatment of syphilis. Early syphilis. By Taliaferro Clark, Thomas Parran, Harold N. Cole, Joseph Earle Moore, Paul A. O'Leary, John H. Stokes, and Udo J. Wile. Vol. XIII, nos. 4, 5, 6, and 7. 87 pages.

DEATHS DURING WEEK ENDED MAY 13, 1933

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended May 13, 1933	Corresponding week, 1932
Data from 85 large cities of the United States:		
Total deaths	7,694	8,023
Deaths per 1,000 population, annual basis	10.8	11.4
Deaths under 1 year of age	570	683
Deaths under 1 year of age per 1,000 estimated live births [1]	48	58
Deaths per 1,000 population, annual basis, first 19 weeks of year	11.9	12.4
Data from industrial insurance companies.		
Policies in force	68,204,929	73,278,071
Number of death claims	13,435	14,368
Death claims per 1,000 policies in force, annual rate	10.3	10.3
Death claims per 1,000 policies, first 19 weeks of year, annual rate	10.8	10.5

[1] 1933, 81 cities; 1932, 80 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended May 20, 1933, and May 21, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended May 20, 1933, and May 21, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended May 20, 1933	Week ended May 21, 1932	Week ended May 20, 1933	Week ended May 21, 1932	Week ended May 20, 1933	Week ended May 21, 1932	Week ended May 20, 1933	Week ended May 21, 1932
New England States:								
Maine	--------	3	2	5	1	296	0	0
New Hampshire	--------	3	--------	--------	37	98	0	0
Vermont	1	--------	--------	--------	34	262	0	0
Massachusetts	32	37	--------	2	473	1,156	0	1
Rhode Island	2	4	--------	--------	1	84	0	0
Connecticut	5	3	3	3	281	299	1	1
Middle Atlantic States:								
New York	60	93	[1] 11	[1] 12	2,428	3,216	6	5
New Jersey	19	31	2	19	1,073	1,092	0	1
Pennsylvania	51	76	--------	--------	1,296	1,905	2	15
East North Central States:								
Ohio	13	23	11	11	529	1,526	0	1
Indiana	21	19	25	12	291	143	2	4
Illinois	20	81	25	87	953	1,174	14	5
Michigan	16	11	5	13	915	2,908	3	5
Wisconsin	1	9	25	22	355	2,397	3	1
West North Central States:								
Minnesota	3	9	1	4	778	63	1	2
Iowa	6	7	--------	--------	76	6	0	2
Missouri	16	32	--------	--------	234	100	2	2
North Dakota	--------	3	--------	--------	64	49	1	0
South Dakota	1	2	--------	--------	19	7	0	0
Nebraska	2	15	--------	--------	275	5	0	0
Kansas	9	11	1	1	282	414	2	3
South Atlantic States:								
Delaware	--------	1	--------	--------	8	--------	0	0
Maryland [2]	2	12	6	9	30	59	0	2
District of Columbia	1	5	--------	--------	19	18	0	0
Virginia	5	--------	--------	--------	365	--------	1	--------
West Virginia	6	12	1	39	100	215	0	1
North Carolina	11	16	1	74	739	672	0	3
South Carolina [3]	8	6	162	625	415	203	0	0
Georgia [3]	2	6	--------	89	178	55	0	0
Florida [3]	4	11	--------	5	19	13	0	1

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended May 20, 1933, and May 21, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended May 20, 1933	Week ended May 21, 1932	Week ended May 20, 1933	Week ended May 21, 1932	Week ended May 20, 1933	Week ended May 21, 1932	Week ended May 20, 1933	Week ended May 21, 1932
East South Central States:								
Kentucky	3	13	6	37	35	73	0	1
Tennessee	4	8	21	37	86	10	2	1
Alabama [3]	8	6	4	26	74	7	0	0
Mississippi	6	8					0	0
West South Central States:								
Arkansas	1	6		19	227	1	0	1
Louisiana	5	21	5	17	42	32	0	1
Oklahoma [4]	1	4	10	29	223	48	3	1
Texas [3]	49	18	92	20	1,088	89	1	0
Mountain States:								
Montana [5]	2	1	3	1	56	117	0	0
Idaho [5]		3	2		16		0	0
Wyoming [5]				1	15	29	0	0
Colorado [5]	2	7	27		3	104	0	1
New Mexico	3	9	2	28	8	36	0	0
Arizona		5	3	1	135		0	2
Utah [2]	1	3			17		0	0
Pacific States:								
Washington	10	5			84	223	1	0
Oregon [3]	3	8	46	30	55	256	0	0
California [5]	37	75	28	59	1,221	696	2	2
Total	452	741	530	1,337	15,653	20,176	47	65

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended May 20, 1933	Week ended May 21, 1932	Week ended May 20, 1933	Week ended May 21, 1932	Week ended May 20, 1933	Week ended May 21, 1932	Week ended May 20, 1933	Week ended May 21, 1932
New England States:								
Maine	0	0	11	25	0	0	3	2
New Hampshire	0	0	22	38	0	0	0	0
Vermont	0	0	10	12	0	7	0	0
Massachusetts	0	0	363	523	0	0	5	4
Rhode Island	0	0	28	63	0	0	0	0
Connecticut	0	0	112	106	0	0	3	0
Middle Atlantic States:								
New York	1	2	653	1,517	1	3	6	18
New Jersey	0	3	208	280	0	0	1	2
Pennsylvania	0	1	728	1,024	0	0	8	5
East North Central States:								
Ohio	2	1	421	225	2	19	8	1
Indiana	1	0	71	52	0	6	5	1
Illinois	1	1	435	281	3	3	12	8
Michigan	0	1	456	464	0	4	2	7
Wisconsin	0	0	111	63	6	0	2	1
West North Central States:								
Minnesota	0	0	101	90	0	5	3	1
Iowa	0	0	25	39	16	45	1	4
Missouri	0	0	56	33	0	0	5	6
North Dakota	0	0	5	5	0	6	1	0
South Dakota	0	0	5	5	0	0	0	0
Nebraska	0	0	25	25	0	12	0	0
Kansas	1	1	31	25	1	12	5	4
South Atlantic States:								
Delaware	1	0	15	11	0	0	0	1
Maryland [2]	0	0	95	80	0	0	2	4
District of Columbia	0	0	8	20	0	0	0	1
Virginia	1	1	35		0		5	
West Virginia	0	0	7	14	0	0	4	13
North Carolina	2	0	39	40	1	0	9	13
South Carolina [3]	0	1	0	3	2	0	14	18
Georgia [3]	0	0	9	6	0	0	11	10
Florida [3]	0	0	2	1	0	0	1	8

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended May 20, 1933, and May 21, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended May 20, 1933	Week ended May 21, 1932	Week ended May 20, 1933	Week ended May 21, 1932	Week ended May 20, 1933	Week ended May 21, 1932	Week ended May 20, 1933	Week ended May 21, 1932
East South Central States:								
Kentucky	0	0	6	91	0	12	2	4
Tennessee	1	0	60	10	0	14	4	10
Alabama [3]	1	0	10	5	0	13	2	3
Mississippi	0	0	4	6	1	21	6	6
West South Central States:								
Arkansas	0	0	2	2	3	7	0	4
Louisiana	1	0	8	14	1	16	6	23
Oklahoma [4]	0	1	10	11	2	14	1	0
Texas [3]	0	0	57	20	28	23	25	5
Mountain States:								
Montana [5]	0	0	3	14	1	4	1	1
Idaho [5]	0	0	1	6	12	0	1	0
Wyoming [5]	1	0	3	6	1	0	0	0
Colorado [5]	0	0	32	25	4	2	0	2
New Mexico	0	0	5	12	0	0	3	3
Arizona	0	0	8	11	1	0	1	0
Utah [2]	0	0	6	1	0	0	0	2
Pacific States:								
Washington	0	0	50	14	8	22	2	2
Oregon [5]	0	0	20	8	11	10	1	4
California [5]	4	2	146	203	25	17	8	11
Total	18	15	4,518	5,529	132	297	179	207

[1] New York City only.
[2] Week ended Friday.
[3] Typhus fever, week ended May 20, 1933, 26 cases: 1 case in South Carolina, 5 cases in Georgia, 1 case in Florida, 11 cases in Alabama, and 8 cases in Texas.
[4] Figures for 1933 are exclusive of Oklahoma City and Tulsa and for 1932 are exclusive of Tulsa only.
[5] Rocky Mountain Spotted fever, week ended May 20, 1933, 35 cases: 9 cases in Montana, 9 cases in Idaho 12 cases in Wyoming, 1 case in Colorado, 3 cases in Oregon, and 1 case in California.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
April 1933										
Alabama	5	49	202	39	393	62	2	43	8	26
Arizona	2	2	15		420	1	0	36	0	3
Arkansas	2	32	65	45	1,496	86	0	11	67	5
Idaho			3		155		0	23	39	10
Illinois	86	103	169	3	2,700		4	1,992	32	29
Indiana	16	80	146		817		3	944	13	8
Maryland	5	27	43		76	1	0	417	0	12
Minnesota	1	28	3		4,480		1	382	4	3
Missouri	12	133	76	5	1,232		0	489	28	6
New Mexico	1	32	24	4	56		0	46	5	9
Ohio	7	139	274	0	3,024		6	3,848	23	33
Oregon		13	160	1	364		1	100	21	0
Pennsylvania	20	286			6,038		3	3,912	0	22
Puerto Rico		53	124	1,984	221	8	0		0	30
Rhode Island	0	15			5		0	113	0	1
South Dakota	2	9	5		54	1	0	82	2	11
West Virginia	3	48	42		725		1	94	5	17

April 1933

	Cases
Botulism:	
Maryland	1
Chicken pox:	
Alabama	73
Arizona	62
Arkansas	175
Idaho	75
Illinois	2,175
Indiana	304
Maryland	615
Minnesota	270
Missouri	235
New Mexico	59
Ohio	2,034
Oregon	118
Pennsylvania	3,787
Puerto Rico	113
Rhode Island	86
South Dakota	168
West Virginia	259
Conjunctivitis:	
New Mexico	4
Diarrhea and enteritis:	
Ohio	10
Dysentery:	
Maryland	1
Oregon	1
Pennsylvania	1
Puerto Rico	290
Filariasis:	
Puerto Rico	7
Food poisoning:	
Ohio	6
German measles:	
Arizona	9
Arkansas	18
Illinois	205
Maryland	16
New Mexico	4
Ohio	183
Pennsylvania	52
Hookworm disease:	
New Mexico	1
Impetigo contagiosa:	
Illinois	1
Maryland	7
Oregon	40
Lead poisoning:	
Illinois	1
Maryland	1
Ohio	8
Lethargic encephalitis:	
Alabama	8
Illinois	8
New Mexico	1
Ohio	4
Pennsylvania	3
Mumps:	
Alabama	167
Arizona	138
Arkansas	65
Mumps—Continued	
Idaho	30
Illinois	683
Indiana	171
Maryland	741
Missouri	404
New Mexico	112
Ohio	285
Oregon	12
Pennsylvania	1,854
Puerto Rico	26
Rhode Island	46
South Dakota	26
West Virginia	5
Ophthalmia neonatorum:	
Arkansas	3
Illinois	6
Maryland	2
Missouri	2
Ohio	73
Pennsylvania	4
Puerto Rico	5
Paratyphoid fever:	
Arkansas	1
Idaho	1
Illinois	1
Puerperal septicemia:	
Illinois	5
New Mexico	1
Ohio	3
Pennsylvania	10
Puerto Rico	16
Rabies in animals:	
Illinois	34
Indiana	24
Maryland	2
Missouri	18
Rocky Mountain spotted fever:	
Idaho	8
Oregon	12
Pennsylvania	1
Scabies:	
Maryland	7
Oregon	26
Septic sore throat:	
Illinois	23
Maryland	15
Missouri	20
Ohio	371
Oregon	3
Rhode Island	2
South Dakota	2
Tetanus:	
Alabama	6
Illinois	3
Maryland	1
Ohio	3
Pennsylvania	1
Puerto Rico	11
Rhode Island	1
Tetanus, infantile:	
Puerto Rico	24
Trachoma:	
Alabama	2
Arizona	95
Arkansas	2
Illinois	30
Minnesota	1
Missouri	58
Ohio	8
Oregon	1
Pennsylvania	1
Puerto Rico	8
Trichinosis:	
Illinois	7
Maryland	1
Ohio	8
Oregon	1
Tularaemia:	
Arkansas	3
Maryland	2
Missouri	1
Oregon	1
Typhus fever:	
Alabama	15
Illinois	1
Undulant fever:	
Arizona	3
Idaho	1
Illinois	4
Maryland	3
Minnesota	3
Missouri	5
Ohio	8
Oregon	2
Pennsylvania	2
Vincent's angina:	
Illinois	57
Maryland	8
Oregon	9
Whooping cough:	
Alabama	192
Arizona	138
Arkansas	89
Idaho	20
Illinois	285
Indiana	122
Maryland	138
Minnesota	717
Missouri	86
New Mexico	57
Ohio	441
Oregon	42
Pennsylvania	867
Puerto Rico	185
Rhode Island	103
South Dakota	19
West Virginia	58
Yaws:	
Puerto Rico	1

WEEKLY REPORTS FROM CITIES

City reports for week ended May 13, 1933

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Maine:											
Portland	0	------	0	0	1	1	0	1	2	8	18
New Hampshire:											
Concord	0	------	0	0	3	0	0	0	0	0	10
Manchester	0	------	0	0	1	0	0	0	0	0	7
Nashua	0	------	0	0	0	0	0	0	0	3	------
Vermont:											
Barre	0	------	0	0	0	0	0	1	0	0	1
Burlington	0	------	0	1	0	4	0	0	0	0	13
Massachusetts:											
Boston	6	------	0	272	19	96	0	15	3	45	211
Fall River	2	------	0	0	0	4	0	2	0	10	33
Springfield	0	------	0	1	0	0	0	0	0	9	27
Worcester	0	------	0	33	6	16	0	2	0	8	------
Rhode Island:											
Pawtucket	0	------	0	0	0	5	0	0	0	0	12
Providence	2	------	0	1	1	16	0	2	0	18	42
Connecticut:											
Bridgeport	0	1	3	27	0	15	0	2	2	3	24
Hartford	0	------	0	8	2	15	0	2	0	0	39
New Haven	0	------	0	8	6	9	0	0	0	7	34
New York:											
Buffalo	5	------	0	60	11	40	0	10	0	49	146
New York	61	12	7	1,929	136	244	0	98	8	129	1,487
Rochester	0	1	0	4	3	24	0	5	0	10	72
Syracuse	0	------	0	0	2	18	0	0	1	1	38
New Jersey:											
Camden	2	------	0	32	2	7	0	1	0	0	35
Newark	0	1	0	273	6	27	0	11	0	32	81
Trenton	0	------	0	26	1	8	0	1	1	1	35
Pennsylvania:											
Philadelphia	4	7	5	445	26	116	0	22	5	2	451
Pittsburgh	1	2	0	7	13	65	0	9	0	31	144
Reading	0	------	0	24	1	6	0	2	0	13	23
Scranton	1	------	------	1	------	7	0	------	0	0	------
Ohio:											
Cincinnati	4	------	1	15	11	39	0	10	0	1	113
Cleveland	9	55	3	5	12	163	0	13	1	33	164
Columbus	0	------	0	16	2	17	0	5	0	0	66
Toledo	0	1	0	251	4	146	0	3	1	3	50
Indiana:											
Fort Wayne	1	------	0	1	1	13	0	0	1	0	------
Indianapolis	0	------	0	131	9	13	0	5	0	7	------
South Bend	1	------	0	1	0	3	0	0	0	11	20
Terre Haute	0	------	1	32	0	7	0	0	0	0	18
Illinois:											
Chicago	2	3	4	505	53	299	1	48	1	25	705
Cicero	0	------	0	2	0	3	0	0	0	0	7
Peoria	------	------	------	------	------	------	------	------	------	------	------
Springfield	0	------	0	0	0	3	0	0	0	0	19
Michigan:											
Detroit	14	------	1	505	17	155	0	28	1	111	248
Flint	0	3	0	24	1	7	0	1	0	5	20
Grand Rapids	1	------	0	5	1	9	0	0	0	17	36
Wisconsin:											
Kenosha	0	------	0	1	0	2	1	0	1	12	12
Madison	1	------	------	61	------	4	0	------	0	2	------
Milwaukee	0	1	1	3	9	35	0	5	0	62	101
Racine	0	------	0	0	0	6	0	1	0	12	6
Superior	0	------	0	2	0	0	0	0	0	16	6
Minnesota:											
Duluth	0	------	0	14	1	2	0	1	0	37	20
Minneapolis	3	------	0	34	8	42	0	1	0	28	106
St. Paul	0	------	0	312	4	24	0	4	0	76	58
Iowa:											
Des Moines	6	------	------	0	------	9	6	------	0	0	27
Sioux City	1	------	------	3	------	3	0	------	0	3	------
Waterloo	0	------	------	1	------	2	2	------	0	0	------
Missouri:											
Kansas City	2	1	1	39	10	35	0	8	0	1	119
St. Joseph	0	------	0	36	1	1	0	0	0	1	9
St. Louis	12	2	------	83	5	11	0	9	0	4	173

City reports for week ended May 13, 1933—Continued

State and city	Diphtheria cases	Influenza: Cases	Influenza: Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
North Dakota:											
Fargo	0	------	1	2	0	3	0	0	0	0	5
Grand Forks	0	------	0	0	0	1	0	0	0	0	------
Nebraska:											
Omaha	1	------	0	128	5	4	1	3	0	10	60
Kansas:											
Topeka	0	------	0	108	0	0	0	0	0	4	15
Wichita	0	------	0	1	1	2	0	0	1	3	18
Delaware:											
Wilmington	0	------	0	12	4	1	0	1	0	0	34
Maryland:											
Baltimore	2	2	1	4	15	57	0	12	0	10	168
Cumberland	0	------	0	4	0	1	0	0	0	0	12
Frederick	0	------	0	0	0	0	0	0	0	0	1
District of Col.:											
Washington	5	------	0	30	12	17	0	12	0	6	155
Virginia:											
Lynchburg	0	------	0	31	0	2	0	0	0	8	13
Norfolk	0	------	0	18	0	3	0	2	0	7	25
Richmond	0	------	0	5	3	5	0	1	1	0	41
Roanoke	2	------	0	19	0	6	0	0	0	3	17
West Virginia:											
Charleston	3	------	0	0	1	0	0	0	0	0	10
Huntington	0	------	------	1	------	1	0	------	0	0	------
Wheeling	0	------	0	39	0	0	0	1	0	5	10
North Carolina:											
Raleigh	------	------	------	------	------	------	------	------	------	------	------
Wilmington	0	------	0	69	1	0	0	0	0	0	9
Winston-Salem	0	------	0	22	0	5	0	1	0	1	11
South Carolina:											
Charleston	0	1	1	0	2	0	0	1	1	13	23
Columbia	0	------	0	0	0	0	0	0	0	0	------
Greenville	0	------	0	7	0	0	0	0	0	1	7
Georgia:											
Atlanta	1	16	0	19	4	4	0	5	2	23	73
Brunswick	0	------	0	0	0	0	0	0	0	0	3
Savannah	0	10	0	0	1	1	0	0	0	0	29
Florida:											
Miami	0	------	0	0	2	0	0	2	0	14	16
Tampa	0	------	0	0	2	0	0	0	0	4	17
Kentucky:											
Ashland	1	------	0	4	0	1	0	0	0	3	------
Lexington	0	------	0	2	2	1	0	1	0	0	12
Louisville	2	------	0	4	3	13	0	3	0	3	54
Tennessee:											
Memphis	0	------	0	50	6	3	0	5	0	33	60
Nashville	0	------	0	6	3	4	0	1	0	0	34
Alabama:											
Birmingham	1	------	0	4	2	4	0	2	2	4	50
Mobile	0	------	0	16	0	1	0	1	0	0	19
Montgomery	1	------	0	52	------	0	0	------	0	4	------
Arkansas:											
Fort Smith	1	------	0	1	------	0	0	------	0	0	------
Little Rock	0	------	0	216	5	1	0	2	1	0	9
Louisiana:											
New Orleans	4	3	2	10	10	2	0	11	1	0	151
Shreveport	1	------	1	0	0	0	0	5	0	0	38
Texas:											
Dallas	13	------	0	------	2	5	1	4	0	4	58
Galveston	0	------	0	0	1	0	0	0	0	0	13
Houston	3	------	0	3	10	3	2	7	0	0	86
San Antonio	2	------	2	20	7	1	0	6	0	0	73
Montana:											
Billings	0	------	0	0	0	1	0	0	0	0	4
Great Falls	0	------	0	0	1	1	0	0	0	3	10
Helena	0	------	0	0	0	0	0	0	0	0	5
Missoula	0	------	0	1	1	0	0	0	0	0	6
Idaho:											
Boise	0	------	0	7	0	1	1	1	0	0	9
Colorado:											
Denver	3	23	1	7	11	13	0	2	0	3	74
Pueblo	0	------	0	0	1	0	0	0	0	3	7
New Mexico:											
Albuquerque	2	------	0	0	0	0	0	2	1	8	8

City reports for week ended May 13, 1933—Continued

State and city	Diphtheria cases	Influenza: Cases	Influenza: Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Utah:											
Salt Lake City	0	------	0	15	3	1	0	2	0	26	30
Nevada:											
Reno	0	------	0	0	0	0	0	1	0	6	2
Washington:											
Seattle	2	------	--------	2	-------	17	0	-------	2	16	--------
Spokane	0	------	--------	0	-------	0	1	-------	0	1	--------
Tacoma	0	------	0	0	1	0	1	1	1	0	21
Oregon:											
Portland	0	------	0	3	8	16	0	2	0	1	75
Salem	0	2	--------	8	-------	0	0	-------	0	0	--------
California:											
Los Angeles	16	15	1	468	15	44	8	24	0	52	203
Sacramento	0	------	0	3	0	2	0	1	1	59	--------
San Francisco	1	4	0	5	4	7	0	11	0	73	150

State and city	Meningococcus meningitis: Cases	Meningococcus meningitis: Deaths	Poliomyelitis cases
Massachusetts:			
Boston	1	0	0
Rhode Island:			
Providence	2	0	0
New York:			
New York	3	2	0
Pennsylvania:			
Philadelphia	2	0	0
Pittsburgh	1	0	0
Indiana:			
Indianapolis	1	0	1
Illinois:			
Chicago	15	6	0
Michigan:			
Detroit	1	0	0
Flint	0	0	1
Wisconsin:			
Milwaukee	1	1	0
Minnesota:			
Minneapolis	1	0	0
St. Paul	1	0	0
Iowa:			
Sioux City	1	1	0
Missouri:			
Kansas City	0	1	0
St. Joseph	2	0	0
Nebraska:			
Omaha	1	0	0
Maryland:			
Cumberland	0	1	0
District of Columbia:			
Washington	1	0	0
Tennessee:			
Memphis	1	0	0
Arkansas:			
Little Rock	1	1	0
Washington:			
Seattle	1	0	2

Lethargic encephalitis.—Cases: Philadelphia, 1; Cleveland, 1; Detroit, 1.

Pellagra.—Cases: Washington, 1; Charleston, S.C., 2; Birmingham, 1; Mobile, 1; Montgomery, 1; New Orleans, 1.

Typhus fever.—Cases: Savannah, 1; Tampa, 1; Montgomery, 1.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Two weeks ended May 6, 1933.—The Department of Pensions and National Health of Canada reports cases of certain communicable diseases for the two weeks ended May 6, 1933, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis					1		1			2
Chicken pox		11	2	273	505	67	30	10	218	1, 116
Diphtheria		1	5	27	19	13	1	2	3	71
Erysipelas				16	9	3		1	1	30
Influenza		11		5	21	1			2	40
Lethargic encephalitis						1				1
Measles	18	14	28	388	315	11	6	2	24	806
Mumps		1			475	46	15		99	636
Paratyphoid fever					4				1	5
Pneumonia	1	2			19				11	33
Poliomyelitis				2						2
Scarlet fever	1	10	7	144	122	29	19	7	10	349
Smallpox					1					1
Trachoma									2	2
Tuberculosis	1	6	20		95	18	1	7	55	203
Typhoid fever		6	3	32	4	4		1	6	56
Undulant fever					10					10
Whooping cough				107	175	85	11	14	8	400

PALESTINE

Vital statistics—Years 1931 and 1932.—During the years 1931 and 1932, births and deaths were reported in Palestine as follows:

	1931	1932
Number of births	46, 011	43, 538
Birth rate per 1,000 population	48. 07	44. 14
Number of deaths	21, 149	21, 958
Death rate per 1,000 population	22. 09	22. 26
Deaths under 1 year per 1,000 births	170. 09	153. 17

Certain diseases were reported in Palestine during the years 1931 and 1932, as follows:

Disease	1931		1932	
	Cases	Deaths	Cases	Deaths
Cerebrospinal meningitis	4	3	5	5
Diphtheria	125	12	180	19
Dysentery	297	12	405	25
Influenza	108	6	790	22
Lethargic encephalitis			1	1
Measles	7, 783	731	4, 507	337
Paratyphoid fever	204	4	220	7
Pneumonia	709	414	722	433
Poliomyelitis	3	2	16	
Puerperal fever	40	21	35	18
Relapsing fever	16		13	
Scarlet fever	372	4	243	2
Typhoid fever	905	76	1, 212	119
Typhus fever	51		30	1
Undulant fever	16		5	

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

(NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for May 26, 1933, pp. 586-596. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued June 30, 1933, and thereafter, at least for the time being, in the issue published on the last Friday of each month.)

Cholera

India—Bombay—Colong.—On April 25, 1933, a case of cholera was reported at Colong, on the railroad between Karachi and Rohri, British India. This case was reported in the Public Health Reports issued May 26, 1933, as having occurred in Karachi.

Philippine Islands.—During the week ended May 20, 1933, 9 cases of cholera with 8 deaths were reported in the Province of Leyte, Philippine Islands.

Plague

Bolivia.—During the month of March 1933 several cases of plague were reported in Tomina Province, Department of Chuquisaca, Bolivia.

Peru.—During the month of April 1933 a confirmed case of plague was reported at Monsefu, and a suspected case at Villa Eten, Chiclayo Province, Department of Lambayeque, Peru.

Smallpox

Bolivia.—During the month of March 1933, 21 cases of smallpox were reported in La Paz; isolated cases in several communities in the same department; 3 cases in Potosi; and some isolated cases in Oruro.

Mexico.—During the month of March 1933, 66 cases of smallpox, with 7 deaths, were reported in cities in Mexico. Eleven cases with 1 death were reported in Mexico, D.F.; 4 cases in Aguascalientes; 4 cases in Chihuahua; 3 cases in San Luis Potosi; and 5 cases in Tijuana.

Typhus fever

Bolivia.—During the month of March 1933, 50 cases of typhus fever were reported in La Paz; isolated cases in several communities in the same Department; and 21 cases in Potosi.

Chile.—During the week ended March 18, 1933, 30 cases of typhus fever were reported in Chile. One case was reported in Santiago; 2 cases in Concepcion; 1 case in Serena; and 3 cases in Talcahuano.

Mexico.—During the month of March 1933, 53 cases of typhus fever, with 10 deaths, were reported in cities in Mexico. Fourteen cases, with 2 deaths, were reported in Mexico, D.F.; 4 deaths in Aguascalientes; 7 cases, with 1 death in San Luis Potosi; and 21 cases, with 1 death, in Zacatecas.

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UNITED STATES TREASURY DEPARTMENT

PUBLIC HEALTH REPORTS

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BY THE UNITED STATES
PUBLIC HEALTH SERVICE

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UNITED STATES PUBLIC HEALTH SERVICE

HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst Surg Gen. R. C WILLIAMS, *Chief of Division*

The PUBLIC HEALTH REPORTS are issued weekly by the United States Public Health Service through its Division of Sanitary Reports and Statistics, pursuant to acts of Congress approved February 15, 1893, and August 14, 1912.

They contain: (1) Current information of the prevalence and geographic distribution of preventable diseases in the United States in so far as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other communicable diseases throughout the world. (2) Articles relating to the cause, prevention, or control of disease. (3) Other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS are intended primarily for distribution to health officers, members of board or departments of health, and those directly or indirectly engaged in or connected with public health or sanitary work. Articles of general or special interest are issued as reprints from the PUBLIC HEALTH REPORTS or as supplements, and in these forms are available for general distribution to those desiring them.

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PUBLIC HEALTH REPORTS

VOL. 48 JUNE 9, 1933 NO. 23

CURRENT PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES[1]

April 23–May 20, 1933

The prevalence of certain important communicable diseases, as indicated by weekly telegraphic reports from State health departments to the United States Public Health Service, is summarized in this report. The underlying statistical data are published weekly in the PUBLIC HEALTH REPORTS, under the section entitled "Prevalence of Disease."

Typhoid fever.—The number of cases of typhoid fever reported for the current 4-week period was 706, as compared with 679, 717, and 883 for the corresponding period in the years 1932, 1931, and 1930, respectively. Regions reporting slight increases were the Middle Atlantic, East North Central, East South Central, and Mountain; those reporting decreases were the South Atlantic, West North Central, West South Central, and Pacific; the New England States reported the same number as last year for this period.

Scarlet fever.—The total number of reported cases of scarlet fever (21,144) represented a 10 percent decrease from last year's figure for the corresponding period. The incidence was approximately the same as in 1931 but was about 20 and 25 percent in excess of the corresponding period in the years 1930 and 1929, respectively. The disease seemed to be most prevalent in the East North Central region. The five States in that area reported 7,882 cases for the current period, which was the highest number reported from those States in the five years for which data are available. In other areas the incidence either closely approximated that of last year or was lower.

Measles.—For the whole reporting area the incidence of measles (67,856 cases) was less than for the corresponding period in any of the 3 preceding years, but was about 10 percent above the incidence in 1929. A comparison of geographic areas shows that within the individual areas there were wide variations. In the New England,

[1] From the Office of Statistical Investigations, U S Public Health Service The numbers of States included for the various diseases are as follows Typhoid fever, 48, poliomyelitis, 48, meningococcus meningitis, 48, smallpox, 48, measles, 48, diphtheria, 48, scarlet fever, 48, influenza, 38 States and New York City. The District of Columbia is counted as a State in these reports

East North Central, and Mountain regions the numbers of cases reported for the current period were less than one-half the numbers reported for the same period last year, while in the West North Central States the number of cases (6,672) was 2.6 times that of last year, in the South Atlantic States 1.4 times last year's figure, in the East and West South Central groups 2.5 and 3.5 times last year's figure, and in the Pacific States there was a slight increase.

Diphtheria.—For the country as a whole the present year continues to maintain a record breaking low incidence of diphtheria. The number of cases reported for the 4 weeks ended May 20 was 2,033, or about 70 percent of last year's figure for the corresponding period and only about 50 percent of the average for recent years. A comparison of geographic areas shows that in all sections of the country, except the East and West South Central, the situation was similar to that described for the country as a whole. While the number of cases reported (377) from the South Central areas was not high, and very closely approximated that of last year for the same period, it was higher than in either of the 3 preceding years.

Meningococcus meningitis.—A decrease in the incidence of meningococcus meningitis was apparent in all geographic areas during the current 4-week period. The number of cases reported (230) was 83 percent of that for the corresponding period last year and less than 50 percent of the incidence in 1931. For this period in 1930 and 1929 the numbers of cases were 806 and 1,155, respectively.

A possible exception to the favorable situation was seen in the East and West North Central States, where an increase of 19 and 36 percent, respectively, over last year's figure was shown. While the incidence has not been unusually high in those regions, the number of cases for each 4-week period of the current year has been in excess of that for the corresponding period of last year.

Poliomyelitis.—Compared with previous years the poliomyelitis situation at the present is very favorable. The number of cases for the current period was approximately the same as that for the corresponding period last year and about 15 percent below the average for the last 5 years. For the current 4-week period the number of cases reported was 76, as against 54 for the preceding 4-week period. The greatest increases were reported from the South Atlantic and West South Central areas. The number of cases was not large in either area, 12 and 8 cases, respectively, but it represented a 50 percent increase in both regions over the preceding period.

Influenza.—For the current 4-week period the incidence of influenza (3,044 cases) was slightly below the level of the corresponding period in the years 1930 and 1929—fairly normal years in the incidence of the disease at this season. In 1932 and 1931 the minor epidemics of those years were still evident at this time, the number

of cases being 7,076 and 3,983, respectively. Each geographic area shared in the favorable situation for the current period. In the South Atlantic States, where an unusual number of cases is continuously reported, the incidence (930 cases, of which 843 were in South Carolina) was the lowest in the 5 years for which data are available.

Smallpox.—The current reported incidence (676 cases) of smallpox for the 4 weeks under report was about 56 percent of last year's reports. For the years 1931 and 1930 the numbers of cases totaled 3,423 and 5,512, respectively. The incidence remains at the relatively low level which it has maintained since the middle of the year 1930. Two geographic areas reported an excess over last year's incidence: In the Mountain region, Idaho reported 24 cases for the current 4-week period as against 4 for the same period last year; and in the Pacific area, California reported 131 for the current period as compared with 52 last year. Decreases in the various other areas averaged about 60 percent.

Mortality, all causes.—The average mortality from all causes in large cities, as reported by the Bureau of the Census, was the lowest in recent years. The rate for the 4-week period ended May 20 was 11.0 per thousand population (annual basis), as against 11.6, 11.9, and 12.5 for the corresponding period in the years 1932, 1931, and 1930, respectively. The average rate for this period for the years for which comparable data are available is 12.9.

THE SHWARTZMAN PHENOMENON: FACTORS COMPLICATING ITS USE IN THE TESTING OF ANTIMENINGOCOCCIC SERUM

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An interesting phenomenon reported by Shwartzman in 1928 may be briefly described as follows: Rabbits were given intracutaneous injections of filtrates of typhoid bacillus cultures. Twenty-four hours later they were given intravenous injections of the same material. Within four to five hours after the second injections many of these rabbits showed pronounced hemorrhagic necrosis at the site of the intracutaneous dose (1). Later, Doctor Shwartzman produced the same phenomenon with filtrates prepared from many other bacteria.

With many of these filtrates, including those from the meningococcus, neutralization of the reaction by immune sera was obtained (2).

In a subsequent report (3) the practical application of these facts to the evaluation of antimeningococcus serum was suggested, and

data were presented to show that serum neutralized the reacting factors of meningococcus filtrates.

It is generally agreed that evaluation of antimeningococcus serum is on an unsatisfactory basis, since the test-tube methods almost universally employed are completely arbitrary. A method involving the neutralization of some positive clinical sign in an animal would seem to be much more desirable. With the hope that this new method would give a better means of evaluating antimeningococcus serum than any of the strictly *in vitro* procedures in use, we applied this technique to a study of antimeningococcus sera in our laboratory. This paper describes some of our experiences with the Shwartzman phenomenon in regard both to the phenomenon itself and to its neutralization by serum.

EXPERIMENTAL WORK

(A) PREPARATION OF THE SHWARTZMAN ACTIVE AGENT

The technique described by Shwartzman (4) (5) was followed with very few deviations. The meningococci were grown on 1 percent glucose agar slants for 18 hours and suspended in 1 percent glucose broth, and 4 cc of the suspension was used as an inoculum for each Blake bottle of glucose agar. After four to five hours the bottles were inverted for the remainder of the 18 to 20 hours' incubation in order that the growth might not be washed off and autolyzed in the small amount of fluid in the bottle. After 18 to 20 hours this fluid was removed and the growth washed off with 0.87 NaCl solution containing 0.4 percent phenol, using 6 to 7 cc per bottle.

The pooled washings were at once centrifugated and filtered through Berkefeld V filters. After 48 hours' refrigerator storage, they were heated at 56° C. for 45 minutes to insure the death of any meningococci that might have passed through the filter. These antigens were made in amounts varying from 25 cc to 600 cc. Since 12 Blake bottles yield only about 50 cc of the finished product, the preparation of large quantities proved laborious. During our studies 31 lots were prepared, representing 15 chosen strains of meningococci.

(B) ACTIVITY OF SHWARTZMAN AGENT

These antigens were now tested for activity. The abdomens of large white rabbits were shaved and intracutaneous injections of 0.25 cc of 1 to 2 and of undiluted antigen were given. These injections were followed in 24 hours by intravenous injections (1 cc per kg of rabbit) of various dilutions of the same material. The results were recorded five hours later. Areas of hemorrhagic necrosis were read as + to ++++ according to the size of the area and intensity of the reaction.

The preparations varied widely in their activity. With some, pronounced hemorrhagic necrosis at the site of the intracutaneous injection was obtained with relatively high dilutions; with others, the activity was much less; still others showed no effect, even though undiluted material was used. This variation among different strains of meningococci was noted by Shwartzman (3) in his first paper on this subject. Such variation was found not only among different strains but also in various lots of antigen prepared from the same strain. Table 1 shows these differences.

TABLE 1.—*Variation in activity of Shwartzman antigens*

No.	Strain	Serological group	Source	Lot No.	Amount prepared	Date prepared	Date of titration	Highest dilutions in which reactions were produced
					Cc			
1	123	I	Rockefeller Institute, 1918	A	50	Oct. 9, 1930	Oct. 14, 1930	1:2.
2				B	50	Oct. 18, 1930	Oct. 27, 1930	1:16.
3	198	I	Detroit, 1929	A	25	Nov. 14, 1931	Nov. 17, 1931	Inactive in all dilutions.
4	331	I	Memphis, 1930	A	50	Jan. 15, 1932	Jan. 18, 1932	1:200.
5				B	50	Jan 22, 1932	Jan. 25, 1932	1:200.
6				D	50	Jan 29, 1932	Feb. 1, 1932	1:400+.
7	267	I	New York State Laboratory Received there from Rockefeller Institute, 1916.	A	200	Mar. 8, 1931	Mar. 10, 1931	1:320.
8				B	200	Mar 14, 1931	Mar. 16, 1931	1:600+.
9				C	200	May 3, 1931	May 4, 1931	1:800.
10	55	II	Rockefeller Institute, 1917.	A	50	Oct. 9, 1930	Oct. 14, 1930	Inactive in all dilutions.
11				B	100	Oct. 18, 1930	Dec. 2, 1930	1:64+.
12				C	40	Apr. 12, 1932	Apr. 14, 1932	1:80+.
13	266	II	New York State Laboratory. Received there from Rockefeller Institute, 1916.	A	50	Jan. 15, 1932	Jan. 18, 1932	Inactive in all dilutions.
14				B	50	Jan. 22, 1932	Jan. 25, 1932	Do.
15				D	50	Jan. 29, 1932	Feb. 1, 1932	Do.
16	390	II	Original Gordon-Murray II, 1915.	A	50	Mar. 2, 1932	Apr. 14, 1932	1:20+.
17	173	II	Detroit, 1929	A	50	Apr. 10, 1932	Apr. 11, 1932	Inactive in all dilutions.
18	57	III	Rockefeller Institute. 1917.	A	50	Oct. 9, 1930	Oct. 14, 1930	Do.
19				B	50	Oct. 18, 1930	Mar. 10, 1931	1:160.
20	302	III	Indianapolis, 1930	A	50	Jan. 15, 1932	Jan. 18, 1932	1:400+.
21				B	50	Jan. 22, 1932	Jan. 25, 1932	1:400+.
22				D	50	Jan. 29, 1932	Feb. 1, 1932	1:400+.
23	60	IV	Rockefeller Institute, 1917.	A	50	Oct. 9, 1930	Oct. 14, 1930	1:2.
24				B	50	Jan. 15, 1932	Jan. 18, 1932	1:100.
25				C	50	Jan. 22, 1932	Jan. 25, 1932	1:100.
26				D	50	Jan. 29, 1932	Feb. 1, 1932	1:200.
27				E	50	Apr. 12, 1932	Apr. 14, 1932	1:20+.
28	395	IV	Gordon-Murray strain, 1915.	A	50	Mar. 2, 1932	do	1:20+.
29	425	IV	do	A	50	Apr. 10, 1932	do	1:20+.
30	158	IV	Chicago, 1928	A	50	do	do	1:20+.
31	155	N.f.*	do	A	50	Oct. 9, 1930	Oct. 14, 1930	Inactive in all dilutions.

* N. f.=*Neisseria flavescens.*

There seemed to be no relation between the activity of the antigens and serological grouping, though some individual strains regularly produced more active filtrates than others, e.g., 267 (see table 1).

The earlier preparations were made from strains which had been maintained in the laboratory for a number of years, i. e., strains 123, 55, 57, 60, 395, 425. It can be seen in table 1 that some of the anti-

gens made from these were not very active. There were also more recently isolated strains which were entirely inactive, e g., 198, 173, 155. Recency of isolation did not seem to be an important factor in this respect. One of the most potent antigens was made from a fairly old strain, 267 (no. 8 of table 1).

(C) DIFFICULTIES MET IN TITRATION OF ACTIVE AGENT

The minimal amount of the active agent capable of causing a definite hemorrhagic reaction at the site of the previous intracutaneous injection in a rabbit was taken as an end-point in titration (5). With many preparations this end-point was very hard to find. Some of the factors responsible for this difficulty were as follows:

(1) There is a great variation in sensitiveness of rabbits to this agent. On one day 50 percent of the rabbits injected with given amounts of antigen would show definite reactions; 10 days later only 25 percent of a new set of rabbits might react to the same dilutions. Seventy-five percent of a third set of rabbits might show positive reactions. Thus, end-points found on several successive days often varied tremendously. Irregularity in reaction was often found in different parts of the same rabbit. Four seemingly identical intracutaneous injections on the abdomen of some rabbits would not react alike Injections made into the skin of the inner surface of the ear showed similar variations in sensitivity. Occasionally a rabbit was found which gave positive reactions on both ears and abdomen, but more often the positive reactions would be irregularly distributed, some rabbits having positive ears and others positive abdomens. Sometimes one ear would be positive and the other negative. Although, on the whole, the skin of the ear reacted more often than that of the abdomen, the ear was nevertheless less satisfactory for routine use, because the end-point of the reaction was less definite. Some of the ear reactions did not develop until after 12 hours, and by that time earlier reactions were often less pronounced. On the other hand, after injections made on the abdomen, reactions were either positive or negative after five hours, and very rarely showed any subsequent change.

Several times an injection into the skin of one ear resulted in symmetrical areas of hemorrhagic necrosis on both, an observation which has also been made by Gratia and Linz (6).

(2) If the end-point in titrating these preparations be taken as the minimum amount that causes a reaction in one rabbit, it is obvious that, as pointed out by Shwartzman (5), several multiples of this amount must be used in order to produce a reaction regularly in a large proportion of animals. Thus it was necessary to use very large doses of the weaker preparations in order to obtain positive reactions with any regularity. This introduced other complications. These preparations, besides containing more or less of the Shwartzman

active agent, contain other things of uncertain nature in unknown quantities. It is difficult to titrate one active principle in the presence of such a mixture. Thus, some weak preparations were very toxic for rabbits, many of which died within a few hours after intravenous injection, though showing no positive Shwartzman reactions. The relation between the toxic agent and the Shwartzman active agent is not clear. They may be identical, but in these experiments there was no parallelism between them. Some of the most active preparations showed very little toxicity, whereas some of the weaker ones were so toxic that amounts large enough to produce Shwartzman reactions in the majority of rabbits would cause the death of the rabbits before the reactions could develop, e g , antigens 57B and 395.

(3) The different preparations used in the experiments reported here varied widely in respect to stability. Some remained apparently unchanged over a period of five months (267–C); others showed deterioration after several weeks (331–D), and some actually seemed to increase in activity on storage.

Some of our experiments have indicated that the Shwartzman agent may be less heat stable than has been reported Incubation for one hour at 37° C. has seemed to decrease activity in some preparations. Table 2 illustrates this effect of heating. It is possible that this heat susceptibility is only apparent and is due to variation in sensitiveness of the rabbits used; but the phenomenon has seemed to occur too frequently to be coincidental. Such a susceptibility to heat would have an important bearing upon the application of the Shwartzman phenomenon to serum testing; for incubating a serum and antigen mixture together at 37° C. before making intravenous injections might give an impression of serum neutralization that did not actually occur.

TABLE 2.—*Effect of heat on activity of Shwartzman agent*

Preparation	Activity of Shwartzman agent*	
	Heated filtrate	Unheated filtrate
	Percent	*Percent*
267-C	50	100
331-D	25	50
302-D	25	100
425	75	50
60 E	50	100
390	50	75

* Activity expressed by percentage of positive skin tests in rabbits.

(D) ACTUAL TITRATION OF SHWARTZMAN ACTIVE AGENT

Most of the factors discussed so far have been mentioned by Shwartzman in his series of papers. It was impossible to titrate many of the weaker antigens, i.e., to find an end-point sufficiently constant

for dependable reactions and sufficiently small so that several multiples did not kill the rabbits before the hemorrhagic necrosis had time to develop. Nevertheless, most of the stronger preparations were titrated quite satisfactorily.

Fully grown white rabbits were used. As a site for intracutaneous injection, the skin of the abdomen gave a more definite end-point than that of any other region. The abdomens were shaved, depilated with barium sulphide, or shorn with special electric clippers.

Injections of 0.25 cc of the undiluted antigen were made into the skin, only one such injection per rabbit being made, and in approximately the same location on each (these rabbits were divided into groups of four). Twenty-four hours later each received intravenously 1 cc per kilo of weight of a dilution of the antigen, each group receiving a different dilution. Both the highest dilution of antigen that could produce a reaction and the lowest dilution that failed to produce a reaction were determined, and the true end-point was taken to lie somewhere between them (5). For the most active preparations, this end-point was found to remain fairly constant for a time.

Shwartzman refers to the smallest amount of antigen that will produce a reaction as a "reacting unit" (5), and has advocated six units as a dose that should cause positive reactions in 75 percent of rabbits. With the active antigen for which a "reacting unit" could be satisfactorily determined, this rule was found to hold true, and our experiments entirely confirmed Doctor Shwartzman's observations on this point. Six reacting units could cause hemorrhagic necrosis in three of four rabbits in a group with a high degree of regularity. When this failed to occur, it usually meant that the antigen had lost some of its activity, and a re-titration was then necessary. The weaker antigens did not follow this rule.

(E) TECHNIQUE FOR STUDYING SERUM NEUTRALIZATION

The antigens that were chosen were made from the following strains: 267, 302, 331, 55, and 158. These were titrated in the manner previously described.

With these it became possible to study the neutralizing properties of antimeningococcic sera. Shwartzman's original methods (3) (7) were used. An intracutaneous injection of 0.25 cc of undiluted antigen was followed 24 hours later by an intravenous injection of a mixture of antigen and serum. This mixture was made up of diluted active agent containing six multiples of the end-point per cc and undiluted serum in the proportion of 4 to 1, i.e., four parts of filtrate to one part of serum. The dose was 1.25 cc per kilogram of rabbit. Unheated mixtures were used.

Each serum was tested on a group of four rabbits, and six or eight serums could be tested in one experiment. With each experiment

another group of four rabbits was given the Shwartzman agent without serum as a control on the activity of the antigen. The reactions were noted five hours after the intravenous injections. Satisfactory activity of the antigen was indicated by the production of positive reactions in at least 3 out of 4 rabbits in the control group. If all four rabbits which received a serum were negative, that serum was said to give "consistent neutralization" (CN) (7). If two or three out of four rabbits were negative, it was said to give "irregular neutralization" (IN). If no rabbits, or only one was negative, the serum was considered to give "no neutralization" (NN).

(F) VALENCY OF THE SHWARTZMAN ACTIVE AGENT

Since meningococci fall more or less into broad serological groups, as far as agglutination is concerned, it seemed important at this point to get additional information as to whether the Shwartzman active agent obtained from the principal groups of meningococci was the same or different. If it should be the same in all groups, the testing of antisera would be greatly simplified. If these preparations were group specific, the testing of polyvalent sera would, theoretically, require four times the number of animals, materials, and labor.

Monovalent group sera were obtained through the kindness of several manufacturers, as follows: Five of Group I, four of Group II, three of Group III, and four of Group IV, prepared in horses, sheep, goats, and rabbits. These were tested for neutralizing properties with a titrated antigen prepared from a representative member of each of the principal serological groups of meningococci. The results of these experiments indicate that the Shwartzman active agent shows no group specificity corresponding to the usual agglutination grouping.

TABLE 3.—*Effect of monovalent sera on antigens of the same and of other serological groups*

Sera		Antigens			
Group	Source	Group I (331)	Group II (55)	Group III (302)	Group IV (158)
I	Sheep	IN [1]	IN	NN	IN
	Sheep	IN [1]	IN	IN	NN
	Horse	CN [1]	IN	NN	IN
	Rabbit	NN [1]	NN	NN	IN
	Rabbit	IN [1]	NN	NN	IN
II	Sheep	IN	IN [1]	NN	NN
	Sheep	NN	IN [1]	NN	IN
	Rabbit	IN	NN [1]	CN	IN
	Rabbit	IN	IN [1]	IN	IN
III	Sheep	NN	IN	NN [1]	CN
	Rabbit	IN	NN	NN [1]	IN
	Rabbit	IN	NN	IN [1]	CN
IV	Sheep	NN	IN	NN	NN [1]
	Sheep	NN	IN	NN	NN [1]
	Rabbit	CN	NN	NN	NN [1]
	Rabbit	CN	IN	NN	IN [1]

CN=Complete neutralization in all 4 rabbits tested.
IN=Neutralization in 2 or 3 of 4 rabbits tested.
NN=Neutralization in 1 or 0 of rabbits tested

[1] Indicates serum of homologous group.

Table 3 shows the effect of the monovalent sera upon the group antigens. Only 1 serum out of 16 completely neutralized the active agent prepared from the homologous group, i.e , horse serum (Group I) neutralized antigen 331 (Group I). This antigen (331) was completely neutralized by two Group IV rabbit sera, although these Group IV sera had little effect on the antigen of their own group. The Group II antigen (55) was not neutralized completely by any serum. The Group III antigen (302) was completely neutralized by one Group II rabbit serum, but by no other; whereas the Group IV antigen (158) was neutralized completely by two Group III sera (one sheep and one rabbit) but by no others, and the Group IV antigen was neutralized completely by two Group III sera (one sheep and one rabbit) but by no others. Irregular neutralization occurred as often with the heterologous sera as with those of the same group. In interpreting the results obtained with these specific group sera, it is well to remember that they were prepared from different strains and in different animals which were under immunization for varying lengths of time. They were prepared as agglutinating sera, and the Shwartzman agent was not used as an antigen in any case. Results obtained with them are, nevertheless, not without significance and offer no evidence to show that there are differences in the Shwartzman agent which correspond to the agglutination groups of meningococci.

There is no indication that the use of several Shwartzman antigens in evaluating polyvalent therapeutic serum would serve as a measure of valency, in the usual sense, and in the following studies of the neutralizing potency of antimeningococcic serum only one antigen was employed. There is no proof that the Shwartzman agent obtained from all meningococci is the same; but if differences do exist, they do not seem to be correlated with agglutination.

(G) NEUTRALIZATION OF SHWARTZMAN ACTIVE AGENT BY THERAPEUTIC POLYVALENT ANTIMENINGOCOCCIC SERUM AND BY OTHER SERA

Strain 267 was chosen as a source of the antigen for routine use. This is a Group I strain which is "broad" enough agglutinogenically to overlap Groups II, III, and IV. Preparations of the Shwartzman active agent made from it have been more stable than those from any other strains used, the reactive unit of one lot remaining constant for more than five months. After this period, frequent retitrations were necessary.

Ninety polyvalent antimeningococcic sera, prepared for therapeutic use by 11 different manufacturers, were tested for the property of neutralizing the Shwartzman active agent, using the technique previously described. All of these, except two, met the Federal requirements as to agglutinin content. The immunization periods of the horses used varied from 6 to 17 months. In addition to these specific

antimeningococcic sera, 25 heterologous immune sera were studied, as follows: 12 antipneumococcic sera, 6 antidysenteric sera, 3 antigonococcic sera, 2 antistreptococcic sera, and 2 diphtheria antitoxins. Four normal horse sera, 1 normal sheep serum, and 1 normal rabbit serum were included, as well as 2 normal human sera, 2 convalescent sera, and 1 serum from a person who had recovered from an attack of meningococcus meningitis several years previously.

Only 38 of the 90 specific antimeningococcic sera, or 42 percent, completely neutralized the Shwartzman active agent when tested by the technique already described. These 38 comprised sera from all 11 manufacturers. Irregular neutralization was obtained with 47 of the 90 sera, or 52 percent. Only five sera, or less than 6 percent, gave no neutralization at all. All five of these had a high agglutinin content. Four sera especially prepared by immunizing horses with the Shwartzman active agent directly were found to give irregular neutralization. The results of these experiments with polyvalent antimeningococcic sera are shown in table 4.

TABLE 4.—*Serum neutralization of Shwartzman active agent*

Sera	Number of sera tested	CN	IN	NN
Specific				
Therapeutic polyvalent antimeningococcic sera	90	38 (42%)	47 (52%)	5 (5.5%)
Sera prepared from Shwartzman antigen	4	0	4	0
Nonspecific	25	2 (8%)	13 (52%)	10 (40%)
Antipneumococcic	12	1	5	6
Antidysenteric	6	0	5	1
Antistreptococcic	2	0	0	2
Diphtheria antitoxin	2	0	1	1
Antigonococcic	3	1	2	0
Normal				
Horse	4	3 (75%)	1 (25%)	0
Sheep	1	0	0	1
Rabbit	1	0	1	0
Human	2	0	0	2
Convalescent (still in hospital)	2	0	0	2
Recovered case (14 years ago)	1	0	1	0

CN=Complete neutralization in all 4 rabbits tested
IN=Neutralization in 2 or 3 out of 4 rabbits tested
NN=Neutralization in 1 or 0 of 4 rabbits tested

None of the 25 nonspecific immune sera studied contained agglutinins for meningococci. Nevertheless two—1 antipneumococcic and 1 antigonococcic—completely neutralized the active agent; while 5 antipneumococcic, 5 antidysenteric, 2 antigonococcic sera, and 1 diphtheria antitoxin gave irregular neutralization. The remaining 11 gave no neutralization. The results obtained with these nonspecific immune sera are included in table 4. They show that 60 percent of these heterologous sera neutralized the Shwartzman active agent as well as did 52 percent of the specific antimeningococcic sera, although only 8 percent gave complete neutralization as compared with 42 percent of the specific sera. One-half of all antipneumococcic

sera tested and 5 out of 6 antidysenteric sera gave this irregular neutralization. However, 40 percent of these nonspecific sera gave no neutralization, as contrasted with only 5.5 percent of the specific sera.

Table 4 also shows that three of the four normal horse sera tested completely neutralized the active agent; the remaining normal horse serum and the one normal rabbit serum gave irregular neutralization; the one normal sheep serum gave no neutralization. None of these normal sera contained agglutinins for meningococci.

Five human sera were also included in these studies—two from normal people, two from convalescent cases of meningitis, and one from an individual who had recovered from an acute attack of meningococcus meningitis several years before. Only this last serum gave an irregular neutralization. Both the normal and the convalescent sera gave entirely negative results. Results with these human sera are also included in table 4.

(H) IS THE APPARENT NONSPECIFICITY OF NEUTRALIZATION DUE TO THE CONCENTRATION OF THE SERUM TESTED?

The results obtained with the 143 sera, presented in table 4, indicated that neutralization of the Shwartzman active agent is not specific when the test is performed as has been outlined. It seemed possible that the neutralizing titer of the specific antimeningococcic sera might be found by employing dilutions sufficiently high to make the neutralization in low dilutions by nonspecific sera of little importance.

TABLE 5.—*Effect of dilution on serum neutralization of Shwartzman active agent*

Kind of serum	Percentage of neutralization given by—	
	Undiluted serum	1:20 dilution of serum
Polyvalent therapeutic antimeningococcic sera	*Per cent*	*Per cent*
A	100	25
B	100	67
C	75	67
D	75	67
Nonspecific sera		
Antipneumococcic sera (M)	100	0
Antigonococcic sera (P)	100	33
Normal sera		
Horse (P)	100	0
Horse (M)	100	33

A group of specific and nonspecific sera were chosen for the study of this question—4 antimeningococcic sera, of which 2 had given complete neutralization and 2 irregular neutralization; 1 antipneumococcic and 1 antigonococcic, both giving complete neutralization; and two normal horse sera, both giving complete neutralization.

These were tested in dilutions of 1:5, 1:10, and 1:20, using the diluted sera in the same way in which the undiluted sera had been used. The results are shown in table 5. The difference in the amount of neutralization obtained with the antimeningococcic sera and with the nonspecific and normal sera was not very great, though the neutralizing titers of the nonspecific and normal sera were, on the whole, somewhat less than those of the specific antimeningococcic sera. There was better neutralization with the undiluted sera than with the diluted.

Some experiments were done to determine the presence of a "prezone" in some of the sera which failed to neutralize consistently. These experiments, while few, did not indicate that a "prezone" was present in any of the sera tested.

DISCUSSION

It is not easy to interpret the results of these studies on serum neutralization of the very interesting Shwartzman reaction. Little is known of its underlying mechanism, or of the nature of the active principle.

Although there is no proof that preparations of the active agent from all strains of meningococci are immunologically alike, there is considerable evidence to show that any differences which may exist do not follow the usually recognized serological groups. One antigen has been used in testing polyvalent and normal sera. This strain was very broad agglutinogenically, but it is possible that results might vary with other antigens.

Nearly all (94.5 percent) of the polyvalent antimeningococcic sera prepared by manufacturers have neutralized the Shwartzman active agent to some extent. Complete neutralization has been obtained, however, when tested by the technique originally described by Shwartzman, with only 42 percent. On the other hand, 60 percent of nonspecific immune sera neutralized as well as at least 52 percent of the specific sera. Five out of six sera from normal animals neutralized to a considerable degree, and in three of these, this neutralization was complete. These three were from horses.

From the data presented here it would be difficult to distinguish an efficient antimeningococcic serum from a normal horse or an antipneumococcic serum, even if complete neutralization be used as a criterion. If "irregular neutralization" be the criterion, it would be impossible to distinguish an antimeningococcic serum from an antidysenteric serum or a diphtheria antitoxin. Apparently serum neutralization of the Shwartzman meningococcus active agent is nonspecific to a marked degree. The occurrence of neutralizing antibodies in 3 of 4 sera from normal horses would seem to interfere

seriously with the significance of such a method of testing therapeutic sera for potency.

Nonspecific neutralization by certain immune sera has been noted by Shwartzman (8), who has made use of these "auxiliary antibodies" in titrating specific sera. The presence of such nonspecific antibodies has in our own experiments been a complication rather than a help. It is difficult to see how complete neutralization under these circumstances can be an indication of therapeutic value, when heterologous sera and normal horse sera show the same effect.

It is possible that this nonspecific neutralization is conspicuous merely because all therapeutic antimeningococcic sera are too low in content of Shwartzman antibodies to neutralize except in very low dilutions. Most of these sera have been prepared primarily with the object of producing agglutinins and not Shwartzman antibodies. Should very potent Shwartzman antibody serum be prepared, it is quite conceivable that the neutralizing titer could be so high that the nonspecific neutralization described in this paper would sink into insignificance. So far no such sera have been obtained, the four prepared with the Shwartzman active agent giving only irregular neutralization with the antigen used. Nevertheless, it may be possible to prepare such sera. Unless this can be done, it is difficult to see how this method of evaluating therapeutic antimeningococcic sera can be used practicably. Could sera of high neutralizing potency be obtained, the relation of the Shwartzman active agent to meningitis in man might be known.

The relation of the Shwartzman principle to the clinical manifestations of meningococcus meningitis is at present undetermined. Branham and Lillie (9) have produced fatal meningitis in rabbits by intracisternal injection of Shwartzman antigen. Such preparations are too complex in composition for the identity of the Shwartzman agent and the "toxin" to be assumed.

CONCLUSIONS

Serum neutralization of the Shwartzman phenomenon produced by filtered meningococcus washings is not restricted to antimeningococcic sera, but also occurs with antipneumococcic, antidysenteric, and antigonococcic sera and with diphtheria antitoxin, as well as with normal horse and rabbit sera. This nonspecific neutralization is so frequent and so marked that it seems to limit the usefulness of the Shwartzman phenomenon in the evaluation of therapeutic antimeningococcic sera.

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ENDEMIC GOITER IN SWITZERLAND

A REVIEW OF RECENT CONTRIBUTIONS TO ITS ETIOLOGY, INCIDENCE, AND PREVENTION

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Although there is still a great deal of speculation, as well as divergence of opinion among continental observers, as to the etiology of endemic goiter, the recommendations of the Swiss public health authorities for the prevention of this widespread affection are unequivocal. In an official publication,[1] the Swiss Department of Public Health has reviewed the findings of the Swiss Commission for the Prevention and Cure of Goiter, which body has strongly recommended the general consumption of iodized table salt, also known as "filled" salt, "full" salt, iodine salt, or salt containing iodine. In support of this recommendation, the Swiss Goiter Commission has presented statistics showing the considerable incidence of endemic goiter and has discussed the need for prophylactic measures.

[1] Bulletin No. 10, Mar. 7, 1931. Swiss Federal Department of Public Health. Translated into English by Margaret Lloyd Sanger, clerk at the American consulate, Zurich, Switzerland.

The Swiss Goiter Commission believes that the most efficacious means of preventing endemic goiter is by supplying the entire population with iodized salt, for cooking as well as for table use. However, it is not practicable, for many reasons, to regulate the supply of iodized salt by Federal laws. Consequently, the commission has urged the several Cantons to introduce and regulate the supply of iodized salt by cantonal decrees. In several cantons such decrees have been effective for some time.

In order that the need for goiter prophylaxis may be better appreciated, the goiter commission has commented upon the effects of the disease and has also presented statistics to show its incidence.

Effects of goiter.—It has long been known that endemic goiter, a simple but abnormal enlargement of the thyroid gland, prevails to an unusual extent in Switzerland. The disease can, either directly or by bringing about a general bodily deterioration, prove very harmful. Through pressure upon the blood vessels of the throat, it greatly impairs the circulation, and by pressing upon the windpipe it not only hinders respiration, but in acute cases may cause sudden death by suffocation. During the period 1911–20 goiter was the cause of 1,516 deaths in Switzerland, according to the death certificates issued, and during the same period 463 persons died of cancer of the thyroid gland. Approximately 3,000 patients with goiter undergo operation each year.

Of even more serious consequence to the Swiss people are the organic troubles caused by goiter. A large percentage of the serious disturbances occurring during the period of growth, such as dwarfism, mental deficiency, idiocy, deafness, and dumbness, are an outcome of endemic goiter as it occurs in Switzerland. These conditions constitute a serious menace not only to individuals but to the prosperity and welfare of the entire country as well.

Incidence of endemic goiter in Switzerland.—That there is considerable goiter in Switzerland is apparent even to inexperienced observers. Thyroid surveys by qualified physicians among selected groups, such as school children, have fully corroborated superficial impressions. The comment and statistics presented by Dr. Otto Stiner,[2] afford striking evidence of the frequency with which goiter is encountered among recruits for compulsory military service, as well as the need for prophylactic measures.

Method of examining thyroids of recruits.—As all males in Switzerland are required to present themselves for military service at the ages of 19 and 20 years, an admirable opportunity is afforded for determining the prevalence of goiter at this period. In order that all examinations

[2] Distribution of endemic goiter in Switzerland Otto Stiner, secretary, Swiss Goiter Commission, and member of the Swiss Federal Department of Public Health. (Presented at the International Conference on Goiter, Aug 24–26, 1927, in Berne, and published in the report of the conference. English translation, edited by Hans Huber, Berne, 1

may be as nearly uniform as possible, regulations have been prepared and standards devised by the chief military physician in collaboration with the Swiss Goiter Commission for the guidance of the various sanitary investigation commissions. Because of the interesting method of making the thyroid examinations and recording the results, the procedure is here briefly described.

The examining physician first studies the neck and chest of the recruit from the front for evidence of venous dilation. Deeply seated goiters are sought by having the recruit swallow. The neck is then measured, the tape being placed at the nape of the neck above the vertebra prominens, encompassing the most protruding point of the base of the neck. This measurement is first taken during quiet breathing. The recruit is then asked to distend (bear down upon) the neck as much as possible while keeping the mouth closed, and the second measurement is taken in the same relative position.

When there is a difference of 2 centimeters or more between the two measurements, there is, according to the Swiss authorities, ground for suspecting the presence of a goiter rich in blood vessels or that there is some interference with venous circulation. This view is held even when inspection and palpation during quiet breathing indicate only an insignificant enlargement of the thyroid gland. However, an increase of less than 2 centimeters in the measurements does not preclude the existence of goiter.

Finally the medical examiner places his hands around the neck of the recruit in such a manner that his two thumbs rest on the nape of the neck while he palpates with the index and middle fingers of each hand. If the form of the thyroid can not be made out in this way, the palpation is repeated while the person examined swallows. In the presence of mensural enlargement it may be surmised that a goiter is present even though it can not be readily palpated and the external appearance of the neck is but little altered.

Recording the results of thyroid examinations.—For military purposes the following findings are regarded as normal:

1. When the groove between the trachea and the lateral cervical muscles is filled by a slightly perceptible cushion and the isthmus can be felt as a thin layer of tissue in front of the trachea.

2. When the thyroid gland can be easily palpated, but the contour of the neck is not perceptibly changed and the gland does not extend into the thorax. Moreover, the neck should not be distended more than 2 centimeters by personal effort, and there should be no difficulty in breathing after considerable exertion.

The presence of goiters is recorded under the following conditions:

1. When the thyroid is uniformly enlarged, and the shape of the neck is materially changed and greatly distended through personal pressure, the presence of a diffuse goiter is recorded.

2. When separate nodules can be definitely palpated in a normally sized or a diffusely enlarged thyroid gland, the condition is regarded as an adenomatous (nodular or lumpy) goiter.

However, fitness for military service depends upon the location of the goiter, its size, and its relation to the trachea and the great vessels of the neck. The presence of a deep goiter, tracheal compression (marked by difficulty in breathing during and after exertion), and great increase in the size and number of the cervical vessels are regarded as constituting unfitness for military service. Unless the nodules are small and noncompressible, the presence of an adenomatous goiter also constitutes unfitness. A recruit with a nodular goiter is not permanently debarred from military service, but is excused from such activities for one year when it is likely that medical or surgical treatment will prove effective and the man declares himself prepared to undergo the necessary régime.

General goiter incidence among recruits.—The percentages of goitrous affections among recruits from the various Swiss Cantons are shown in table 1, which represents in condensed form the more comprehensive information available from each district. A study of this table shows that the incidence of endemic goiter ranges from 5.7 percent in the Canton of Vaud to 82.4 percent in the Canton of Zurich. The percentage ranges of incidence, which show a wide variation within the same Cantons, are set forth in the third column of the table. In the fourth column are shown the mean percentages, which range between 12.4 percent, in the Canton of Tessin, to 67.4 percent, in the Canton of Appenzell A. Rh. Considering that this comparatively high incidence of goiter occurs among young male adults, in which age and sex group the disease is least frequent, the greater incidence of the malady in the general population can be more readily understood.

TABLE 1.—*Percentage range of incidence and mean percentage incidence of endemic goiter among recruits for military service in 25 Cantons in Switzerland* [1]

Canton	Number of districts reporting	Percentage range of incidence	Mean percentage incidence
Zurich	11	34.1–82.4	53.4
Berne	30	11.4–64.8	40.7
Lucerne	5	32.0–50.6	45.2
Uri			41.0
Obwalden			53.9
Nidwalden			37.4
Schwyz	6	15.4–24.8	15.5
Glarus			41.1
Zug			45.4
Fribourg	7	16.2–58.0	36.0
Solothurn	10	17.0–33.9	23.6
Baselstadt			20.6
Baselland	4	13.7–26.5	21.3
Schaffhausen	6	39.8–52.8	45.7
Appenzell I. Rh	3	60.9–63.6	61.8
Appenzell A. Rh			67.4
St. Gall	14	35.5–69.4	56.2

[1] From Bulletin No. 10, dated Mar. 7, 1931, issued by the Swiss Federal Department of Public Health.

TABLE 1.—*Percentage range of incidence and mean percentage incidence of endemic goiter among recruits for military service in 25 Cantons in Switzerland*—Contd.

Canton	Number of districts reporting	Percentage range of incidence	Mean percentage incidence
Grisons	14	22.5–43.1	30.1
Aargau	11	22.5–73.0	34.5
Thurgau	8	38.1–69.6	61.3
Tessin	8	7.7–27.4	12.4
Vaud	19	5.7–29.0	15.6
Valais	13	9.3–80.4	51.1
Neuchatel	6	12.9–27.3	22.0
Geneva			25.8

Nodular goiter.—In many of the Swiss Cantons nodular goiter, also known as lumpy goiter, struma nodosa, or adenomatous goiter, is encountered with comparative frequency among recruits. In table 2, which has been condensed from the original compilation, are shown the percentage ranges of incidence and the mean percentage incidences in each of the 25 Swiss Cantons. Only in 2 of the 186 districts was nodular goiter absent among the recruits examined in 1924 and 1925. The percentage range of incidence was between zero in the Cantons of Berne and Grisons and 49.2 percent in the Canton of St. Gall. The mean percentage incidence of struma nodosa, as shown in column 4 of table 2, ranged from 2.2 percent, in the Canton of Baselstadt, to 31.4 per cent, in the Canton of Uri.

TABLE 2.—*Percentage range of incidence and mean percentage incidence of nodular goiter among recruits for military service in 186 districts of 25 Cantons in Switzerland during the years 1924–25* [1]

Canton	Number of districts reporting	Percentage range of incidence	Mean percentage incidence
Zurich	11	9.9–38.4	19.8
Berne	30	0 –33.5	13.7
Lucerne	5	17.6–31.6	22.7
Uri	1		31.4
Obwalden	1		15.1
Nidwalden	1		6.7
Schwyz	6	8.3–19.4	11.2
Glarus	1		14.8
Zug	1		14.5
Fribourg	7	4.4–20.5	9.3
Solothurn	10	1.9–15.6	7.6
Baselstadt	1		2.2
Baselland	4	2.7– 7.9	4.1
Schaffhausen	6	5.8–12.9	10.2
Appenzell I. Rh	1		23.0
Appenzell A. Rh	3	20.3–22.8	21.1
St. Gall	14	11.2–49.2	23.3
Grisons	14	0 –21.3	8.1
Aargau	11	3.9–33.4	12.7
Thurgau	8	11.7–33.8	20.2
Tessin	8	.8– 8.8	3.3
Vaud	19	.6–14.2	4.0
Valais	13	1.3–19.5	7.1
Neuchatel	6	1.2– 4.7	2.7
Geneva	1		5.0

[1] Condensed from Table IV accompanying the article, Distribution of endemic goiter in Switzerland, by Otto Stiner. Report of the International Conference on Goiter, Berne, Aug. 24–26, 1927, p. 384, edited by the Swiss Goiter Commission, 1929. (English translation, Hans Huber, editor.)

Rejections because of goiter.—When a comparison is made between the most recent statistics and former records of goiter incidence, it is apparent that there has been an increase in the number of cases. At the same time the intensity of the malady has decreased, as indicated by the smaller number of large and symptom-producing goiters encountered. In table 3 are shown the percentage ranges of rejections and the median percentages of rejections because of goiter among the recruits examined in the years 1924 and 1925. In 7 Cantons and in 83 districts out of 186 no recruits had to be released on account of goiter. In 24 other districts the number rejected did not reach 1 percent of those examined. On the average, 1.3 percent were found to be entirely or partially unfit on account of goiter, a low figure when compared with figures of former days; yet the requirements for military service have become more rigid. According to Hunziker, 11.4 percent of the recruits examined in 1886 and 8.7 percent of those examined in 1891 were declared unfit for service.

TABLE 3.—*Percentage range of rejections and mean percentage of rejections because of goiter, among recruits for military service in 186 districts of 25 Cantons in Switzerland, during the years 1924–25* [1]

Cantons	Number of districts reporting	Percentage range of rejections	Mean percentage rejections
Zurich	11	1.6–5.6	3.5
Berne	30	0 –5.3	2.3
Lucerne	5	4.5–8.8	5.8
Uri	1	----------	.7
Obwalden	1	----------	1.9
Nidwalden	1	----------	1.9
Schwyz	6	.9–3.3	2.2
Glarus	1	----------	.1
Zug	1	----------	1.7
Fribourg	7	0 –0	0
Solothurn	10	0 –2.3	.35
Baselstadt	1	----------	.2
Baselland	4	.2–2.3	1.1
Schaffhausen	6	0 –2.9	.7
Appenzell I. Rh.	1	----------	.7
Appenzell A. Rh.	3	.5–1.0	.8
St. Gall	14	0 –5.3	1.0
Grisons	14	0 –1.5	0
Aargau	11	.4–5.8	3.4
Thurgau	8	0 – .7	.25
Tessin	8	0 –0	0
Vaud	19	0 –0	0
Valais	13	0 –3.3	0
Neuchatel	6	0 –0	0
Geneva	1	----------	0

[1] Table II from the article, Distribution of endemic goiter in Switzerland, by Otto Stiner. Report of the International Conference on Goiter, Berne, Aug. 24–26, 1927, p. 382, edited by the Swiss Goiter Commission, 1929. (English translation, Hans Huber, editor.)

Peculiarities of goiter distribution in Switzerland.—In the high plateau lands goitrous conditions and rejections plainly run along parallel lines. Rejections were frequent in the following goiter sections of Switzerland:

1. Lucerne.
2. Southern part of the Canton of Aargau.
3. Southeastern part of the Canton of Zurich.
4. Western parts of the Cantons of Thurgau and St. Gall.

In the lower Alps the relationship between goiter and unfitness for military service is less pronounced. Thus, in the Cantons of Berne and Lucerne the percentages of sufferers from goiter run quite high, approximately up to 50 percent, and the number of those unfit for service is correspondingly high, up to 5.3 percent. In the Canton of Appenzell, on the contrary, where goiter prevails as high as 60.9 to 67.4 percent, the number of rejected recruits is relatively low, 0.5 to 1.0 percent. In certain regions there is a parallel course between goiter in general and nodular goiter. However, in other regions this fails to hold true. From the Canton of Uri 41.0 percent of the recruits were goitrous and 31.4 percent were adenomatous. In the Glenner district, which also lies at a high altitude in the mountains of the Canton of Grisons, 43.1 percent of the recruits had goiters, but only 7.8 percent were of the nodular variety. Likewise in the Valais district of Herens, where 51.1 percent of the recruits were goitrous, only 3.8 percent were presumably adenomatous.[3]

According to Stiner, the so-called "mountain goiter," characterized by abnormal shape and enormous size, is becoming rare. Of special interest is the fact that recruits rejected because of goiter do not necessarily come from the mountainous regions but rather from low-lying strips of land, and especially from the high plateau lands. The Rhone Valley, as far as Martingy and the Rhine Valley up to Lake Constance, are two striking examples of comparatively low regions in which goiter has apparently increased. According to Professor Galli-Valerio, goiter now seems to be more frequent in the mid and low land sections of Switzerland.

Special observations in Fribourg and Vaud.—In order to clear up the much contested question of goiter incidence in the Fribourg-Vaud boundary, a special study was made by an investigator from the University of Berne. Formerly it was believed that goiter ceased at the western boundary of the Cantons of Fribourg and Vaud, which is supplied with salt from the Bex salt works, which salt is said to contain iodine in natural combination. On the contrary, the inhabitants of the Vaud enclave, which is entirely surrounded by Fribourg territory and are quite like the Fribourg people in their mode of living, are exceedingly goitrous. The Vaud members of the Swiss Goiter Commission have long declared that the Canton of Vaud is not free from goiter. Stiner believes that these findings tend to disprove the theory that goiter is due to a deficiency of iodine.

For his comparative investigations Th. von Fellenberg chose the Jura town of La Chaux-de-Fonds, which, in his opinion, was free from

[3] Inasmuch as the thyroid examinations of recruits were made by different physicians in the several Cantons, the possibility that the discrepancies mentioned by Stiner may have been due to variations in skill of the examiners and differences in applying the standards, should receive due consideration when these results are interpreted.

goiter, and the Emmental village of Signau, in which goiter was supposed to be quite prevalent. Furthermore, he selected the villages of Effingen, Hornussen, Kaisten, and Hunzenschwill in the Jura Mountains of the Canton of Aargau. Von Fellenberg assumed that there was scarcely any goiter in Effingen, while in the other villages the disease was believed to be present to a considerable extent. However, according to the data collected by the recruiting commission, the classification is not correct; at least it does not apply to young men in these villages who are 20 years of age. Chaux-de-Fonds is by no means free from goiter. On the other hand, the disease is not particularly prevalent in Signau. The two districts are classed in the same category, having between 20 and 30 percent of goiter. Effingen is not free from the disease. Stiner believes that if there is a relationship between endemic goiter and iodine deficiency, it is manifested in degenerative processes such as the formation of thyroid nodules rather than in the causation of endemic goiter. In support of this belief he cites the finding of 2.7 percent of nodular goiters in Chaux-de-Fonds and 10.7 percent of the same type in Signau.

Various views of the etiology of endemic goiter.—The conception that endemic goiter is due to a deficiency of iodine has not met with general acceptance. However, the failure to accept this theory, so widely supported by practical experimentation, application, and experience, is due in large part to an inadequate understanding of the underlying principles.[4]

At the International Conference on Goiter held in Berne in 1927 many views were advanced as to the etiology of endemic goiter. However, if the various etiological factors advanced at that time are carefully considered, it will be seen that practically all the ideas are included in the oft-repeated conception of the disease as set forth by Marine. However, because of the interest attached to some of the opinions concerning the etiology, a few may be mentioned here. All the statements quoted were made before the International Conference on Goiter, which was held in Berne in 1927.

[4] Endemic goiter is often called simple goiter; but it is simple in name only, for its causes are distinctly complex in character. In order that there may be no confusion or misunderstanding as to the relationship between iodine and endemic goiter as conceived by Marine, the American authority, his clear-cut explanations may here be restated. Marine has repeatedly emphasized that endemic goiter may be due either to an absolute or relative deficiency of iodine. (David Marine: The importance of our knowledge of thyroid physiology in the control of thyroid disease. Arch. of Int. Med., vol. 32, no. 6, pp. 811–827, December, 1923.) (Abs. Pub. Health Rep., vol. 39, no. 3, pp. 107–111, Jan. 18, 1924, Reprint No. 896.) In the case of absolute deficiency there is real shortage or actual lack of iodine in the food and water customarily available. In the case of relative deficiency, on the other hand, iodine may be available in sufficient quantities, but through some interference it may not be possible for the element to reach the gland and be utilized. Then, too, it may happen during adolescence, pregnancy, lactation, and the menopause, that the demand for iodine may be greater than the available supply, whereupon the gland undergoes hypertrophy. In all probability the majority of simple goiters are due to deficiencies of iodine which are relative and often complicated in character. Certain infections and intoxications, as well as the consumption of diets in which fat and proteids predominate, may likewise cause endemic goiter by interference with iodine intake.

Some theories of goiter etiology.—According to Dr. Maurice Freyss, of Strasburg-La Robertsau, endemic goiter is due to a variety of causes, including infestation of the intestinal canal with parasites.

Dr. E. Folley, of Paris, maintained that the condition is caused by the simultaneous presence of spirillæ and intestinal parasites. He claimed that the disease could be relieved by destroying the spirillæ with remedies containing arsenic and the parasites by the use of oil of chenopodium. He has abandoned the use of iodine.

According to Dr. Achille Marchesa Monneret, of Armeno, Italy, endemic goiter is associated with adverse economic conditions, poor hygiene, and improper food.

Dr. Andre Crotti, of Columbus, Ohio, stated that the following organisms are common both to endemic goiter and goitrigenous drinking water: (1) a gregarine; (2) a spirillum; (3) a flagellated infusorium; (4) a fungus.

By using iodine, which, according to Crotti, acts as a bactericide, the organisms are destroyed and the goiter is caused to disappear.

Dr. Robert McCarrison, of Coonoor, South India, believes that two theories have survived among the many advanced as the cause of endemic goiter: First, the iodine deficiency theory, which sees in the poverty of iodine in the water, soil, and foods grown on that soil, the essential cause of goiter; and, second, the infectious or toxic theory, which attributes the disease to some unknown pathogenic organism or its products. McCarrison believes that the truth lies in a judicious blend of both theories.

Dr. B. Galli-Valerio, of Lausanne, in commenting upon the many theories expounded during the conference, noted that a majority of the speakers favored drinking water as a cause of goiter. Thus, germs assumed to be in the water and chemical compounds absorbed from certain subsoils through which the water passed were frequently put forth as causes of the disease. However, the manner in which these various factors influenced thyroid enlargement was not clearly stated. Galli-Valerio was skeptical as to the influence of the factors mentioned, but was willing to admit that, as existing goiter may become aggravated through the use of contaminated drinking water, provision for potable water is a wise part of any campaign against goiter.

Prof. W. Kolle, of Frankfort-on-the-Main, regarded the iodine deficiency theory of goiter causation as the best established, particularly because of its practical success in reducing the incidence of thyroid enlargement among school children in endemic regions. Dr. Marcel Rhein, of Strasburg, was willing to accept the usefulness of iodine in preventing endemic goiter provided the treatment was supplemented by a diet rich in vitamins.

Prof. G. Pighini, of Reggio-Emelia, Italy, asserted that endemic goiter is due to the consumption of certain waters containing toxic chemical substances which enter into action with iodine compounds of the organism, more especially with the iodized hormones of the thyroid.

Stiner believes that nodular goiter is much more common among the German-Swiss, and ascribes the condition to the fact that these people have preserved their manners and mode of living, particularly their nutritional customs, through many generations. The vitamins are in part quite generally destroyed, owing to the habit of the housewives of adding soda to certain articles of food so that they will cook more quickly. It is well known, says Stiner, that the vitamins are very rapidly destroyed in an alkaline medium, even those which are heat proof in the presence of acids. The fundamental difference between the German-Swiss cuisine and that of Romance Switzerland lies in the fact that in the latter the foods containing iodine or vitamins are not subjected to improper cooking such as is prescribed in the cook books of the German-Swiss. Thus the mineral substances, including iodine, and the vitamins, are removed in great part before the foods are served at the table. Stiner believes that ultimate success in the prevention and cure of goiter depends more on a suitable revision of the cook book than on new scientific achievements. Coincident with the great economic boom, which Switzerland enjoyed at the beginning of the second decade of the present century, the severe varieties of goiter grew less and less in number. Thus in 1911 and 1912 only 2.9 percent of the recruits were unfit because of goiter. The explanation for this condition is to be seen directly in the betterment of standards of living.

Iodized salt for goiter prophylaxis.—In urging the general consumption of iodized table salt the Swiss Goiter Commission and the Federal Department of Public Health tacitly admit that this "silent" medication has definitely proved its efficiency in preventing endemic goiter, no matter what may be the underlying cause of the disease. The product used in Switzerland contains 5 milligrams of potassium iodide to each kilogram of sodium chloride, a proportion which is exceeded in some of the natural salt deposits. The iodizing is carried out in the salt works, 1 gram of potassium iodide being mixed with 200 kilograms of sodium chloride. According to the Goiter Commission 1 gram of iodide was often prescribed for a goiter patient in a single day. It is estimated that approximately 50 years would be required to consume 1 gram of potassium iodide mixed with ordinary table salt in the proportions recommended in Switzerland. In such small quantities iodine can not well prove harmful. If, in exceptional instances, a slight disturbance is occasioned by the use of iodized salt, rectification follows the return to the uniodized variety.

Consumption of iodized salt in Switzerland.—There has been a steady increase in the consumption of iodized salt in Switzerland since 1922. The percentage consumption of this product in the several Swiss Cantons during the period from 1922 to 1929 is shown in Table 4. It will be noted that in 1929 iodized salt was used exclusively in nine Cantons—Vaud, Nidwalden, Neuchatel, Schwyz, Schaffhausen, Obwalden, Zug, Uri, and Tessin. The annual consumption of iodized salt, in kilograms, from 1922 to 1929 is shown in table 5. It will be noted that the amounts have increased steadily and that in 1929 a large amount of this prepared salt was consumed.

TABLE 4.—*Percentage consumption of iodized table salt in the several Swiss Cantons during the period 1922–29* [1]

Canton	Year							
	1922	1923	1924	1925	1926	1927	1928	1929
Vaud	0	25	100	100	100	100	100	100
Nidwalden	0	47	100	100	100	100	100	100
Neuchatel	0	0	15	100	100	100	100	100
Schwyz	0	0.5	1	1	100	100	100	100
Schaffhausen	0	4	3	11	99	100	100	100
Obwalden	0	7	8	8	50	100	100	100
Zug	0	23	26	81	97	88	100	100
Uri	0	0	0	0 2	0.1	0.2	0.3	100
Tessin	0	0	0	0	0	0	0	100
Valais	0	0	33	63	65	75	78	80
Appenzell A. Rh	43	55	75	75	67	67	67	73
Appenzell I. Rh	0	34	50	50	48	46	53	54
St. Gall	0	12	24	27	25	26	27	47
Glarus	0	4	83	37	27	37	33	41
Thurgau	0	27	36	39	35	34	35	36
Grisons	0	3	6	9	9	13	16	18
Zurich	0	18	21	18	18	18	17	15
Baselstadt	0	5	10	12	12	13	14	15
Aargau	0	4	9	11	11	12	12	12
Baselland	0	2	5	5	11	12	12	10
Lucerne	0	5	3	4	6	6	6	7
Berne	0	0.8	1	4	4	4	4	5
Solothurn	0	1	2	2	2	3	3	3
Fribourg	0	0	0	2	2	2	2	2
Geneva	0	0.1	0.2	0 2	0.2	0.5	0.5	0.8

[1] The figures show the percentage of iodized salt consumed in comparison with the total amount of salt used. In those Cantons showing 100 percent the consumption of iodine-free salt amounts to less than one-half of 1 percent.

Table from Bulletin No. 10, dated Mar. 7, 1931, issued by the Swiss Federal Department of Public Health

TABLE 5.—*Amount (in kilograms) of iodized table salt consumed in Switzerland during the period 1921–29* [1]

Year	Kilograms of iodized salt	Year	Kilograms of iodized salt
1922	200,000	1926	11,800,000
1923	3,500,000	1927	12,800,000
1924	7,500,000	1928	13,100,000
1925	10,000,000	1929	14,482,000

[1] From Bulletin No. 10, Mar. 7, 1931, issued by the Swiss Federal Department of Public Health.

When iodized salt is used in such large quantities two questions naturally arise: First, Is it actually efficient in preventing endemic goiter? and second, Is it harmful, particularly to individuals having

goiters? At the International Conference on Goiter in Berne there was considerable discussion on these points.

Does iodized salt prevent endemic goiter?—If iodized salt were the only goiter prophylactic used it would be comparatively simple to gage its effects. However, when goiter prevention is practiced it often takes the form of individual as well as general measures. In any event the situation is greatly complicated by the simultaneous administration of iodine in several forms. Despite this obvious handicap to accurate appraisal, a number of observers assert that the widespread consumption of iodized salt is beneficial. Thus Dr. H. Eggenberger, of Herisau, Switzerland, summarized the results of five years' use of iodized salt in the Canton of Appenzell, as follows:[5]

1. Operations for relief of goiter diminished 75 percent since 1923.
2. There was a total disappearance of congenital goiter.
3. The number of still-births and deaths among infants, due to thyrogenous debility, was diminished.
4. There was an average increase in weight at birth of 100 grams.
5. There was a disappearance of goiter among young school children.
6. There was a decrease in the incidence of goiter among adults.
7. No iodism due to the use of iodized salt was detected.

Prof. Wagner von Jauregg, of Vienna, cited a number of instances in which favorable results followed the use of iodized salt. In 1925 Zeller reported from Appenzell that 22 women who had used iodized salt during pregnancy gave birth to thyroid-normal infants. At the same time among 9 women who did not use such salt there were 7 thyroid-enlarged and only 2 thyroid-normal infants.

Bayard,[6] according to Wagner von Jauregg, demonstrated the ability of iodized salt to cause the disappearance of goiter, first among the members of five families and later in the populations of two villages. Dr. Hans Sepp, of Dietmannsried, has reported the observations in his sick-fund consultation practice which included persons beyond the school age in two regions, Kempten and Southofen, where iodized salt was used. During the six quarters prior to the use of the "full" salt between 15.4 and 22.6 percent of those applying for relief came because of goitrous conditions, while during the eight quarters following the introduction of iodized salt between 3 and 13.7 percent of his consultations were on account of goiter.

According to Eggenberger the measurements of thyroid areas of boys and girls entering the schools in Kempten in 1924, prior to the general use of iodized salt, were 23.8 and 22.1 square centimeters, respectively. Boys and girls entering school after iodized salt had

[5] These observations were reported in detail in vol. III, Handbuch der Innern Secretion, by H. Hirsch.
[6] O. Bayard: The goiter question. Schweiz. med. Wochen., vol. 53, pp. 701-724, July 26, 1923.

been supplied for two years had thyroid areas of 9.5 and 11.7 square centimeters, respectively.

Wahner-Jauregg also reported that goiter operations were fewer in number in Vienna following the use of iodized salt. There was also a decrease in the incidence of endemic goiter among the school children of Vienna between the years 1923 and 1927. However, this result could not be ascribed entirely to the consumption of iodized salt, for other prophylactics were used at the same time.

Dr. G. Maggia, of Sondrio, Italy, conceded the beneficial influence of iodine in the prophylaxis of endemic goiter but maintained that the measure is purely empirical. He believed improvement in the standards of living to be more important than the administration of iodine. Dr. Fr. Messerli, of Lausanne, who held a somewhat similar opinion, believed that the use of iodized salt was only a partial solution of the problem of prophylaxis. According to Messerli, iodides act upon the thyroid hypertrophy, which is a symption of goiter. The underlying cause of the goiter must be removed by proper hygiene, safe water, and suppression of infestation.

Alleged deleterious effects of iodized salt.—According to the Swiss Goiter Commission the greatest number of disturbances to the human system through the use of iodized salt have been reported in the United States of America, where a much larger quantity of iodine is used in the prepared table salt. In Switzerland injury to goiter patients through the use of iodine has been caused by so-called "wild" treatments; that is, by using the medication without competent guidance. The commission warns that all patent medicines used for the treatment of goiter contain iodine in excessive amounts, even when advertised as iodine free, and having such harmless names as "herb pills," etc. The commission feels that if the efforts to reduce the prevalence of endemic goiter by rational measures prove successful the uncontrolled use of iodine will steadily become lessened.

In order to determine whether iodized salt was responsible for the aggravation of existing goiters or harmful effects, Stiner circularized the 3,008 physicians in Switzerland. Among the 1,675 physicians who replied to the questionnaire, 79 reported a total of 167 cases in which it was thought that the use of iodized salt had been responsible for damage. Upon investigation it was found that only in 18 instances could the salt be held responsible. In this connection it is interesting to note that investigations by Eggenberger revealed the absence of iodine from much of the salt which was alleged to have been responsible for harmful effects.

Prof. L. Michaud, director of the medical clinic at Lausanne, reported that after the use of iodized salt in the Canton of Vaud over a period of three years not a single instance of iodism or of iodine-Basedow had been encountered either in private or hospital practice.

Professor Zollikofer, physician in chief of the department of internal medicine in the cantonal hospital of St. Gall, in which Canton a large number of iodized-salt disturbances were alleged to have occurred, is convinced that the advantages of iodized salt prophylaxis infinitely exceed the disadvantages. He declared that he had never observed any injurious effects from the use of iodized salt

Doctor Roth, director of the cantonal hospital in Winterthur, has reported one case of iodism due to the use of iodized salt, but states that the condition cleared up promptly when uniodized salt was substituted.

Prof. A. Dieudonne, of Munich, stated that in Lindau, where cases of goiter were formerly of frequent occurrence among infants and small children, such cases are no longer observed since the introduction of "complete" salt. Furthermore, there have been no instances of health impairment which might be attributed to the consumption of iodized salt.

Despite these opinions as to the harmlessness of iodized salt, several Swiss physicians, namely, De Quervain and Bircher, have maintained from the beginning that this preparation has caused considerable harm. De Quervain [7] maintains that there have been no definite results following the addition of iodine to table salt. Furthermore, he has protested that iodine prophylaxis is too delicate a procedure to be carried out on such an extensive scale. The controlled sale of iodine and the exclusion of all hypersusceptible persons from treatment, he believes, are also necessary. More recently, however, de Quervain undertook personally the study of cases of illness apparently caused by the consumption of iodized salt. He concluded that hyperthyroidism may occur spontaneously without iodine consumption and that the number of cases reported is well within the range of spontaneous morbidity.

According to Bircher,[8] the uncontrolled use of iodine by the laity is to be condemned. All patients, he maintains, should be under the care of physicians. In 1920 Bircher saw 36 cases of thyropathy following the use of iodine, even in small doses. Furthermore, the physiology of the thyroid in normal and goitrous cases is so indefinite, the pharmacology of iodine so contradictory, and the experiences are so different, that it seems to Bircher a dangerous experiment to administer this effective poison to any great extent over a long period, either in food or otherwise. In Bircher's cases there was an impairment of health caused by the erroneous taking of iodized instead of plain salt. At the same time it should be mentioned that Eggenberger observed cases of thryotoxicosis in which careful investigation showed that the table salt was entirely free from iodine.

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[7] F. de Quervain Iodine and Prophylaxis, Schweiz med. Wochen, Aug 31, 1922

[8] E. Bircher: Iodine therapy of endemic goiter. Schweiz. med Wochen, July 20, 1922.

SUMMARY

According to the Swiss Goiter Commission it has long been known that iodine, when employed in proper doses and under skillful direction in selected cases, will cause the disappearance of certain goiters. It has also been proved, experimentally and practically, that the administration of iodine in small doses will prevent endemic thyroid enlargement. After listening to the various papers in the Berne conference dealing with the etiology of endemic goiter, Kolle commented that such a typical disease as goiter could not possibly be due to so large a number of causes. He concluded that the etiological factors, such as altitude, improper diet, lack of vitamins, close blood relationship, heredity, injury to the nervous system, infectious diseases, intoxications, uncleanliness, improper hygiene, and other ascribed causes, are simply auxiliary factors which create the predisposition to thyroid enlargement. Kolle heard no convincing argument against the theory that the relative or absolute deficiency of iodine is the dominant cause of endemic goiter.

At the end of the conference on goiter, Dr. W. Silberschmidt, of Zurich, concluded that no effective arguments had been produced against the prophylaxis of endemic goiter by means of iodized table salt. Therefore, he felt that the action of the Swiss Goiter Commission in advocating this measure has been fully justified and confirmed.

COURT DECISION RELATING TO PUBLIC HEALTH

Marriage annulled where one party was venereally diseased at time of marriage.—(Delaware Superior Court; *Doe* v. *Doe*, 165 A. 156; decided Feb. 21, 1933.) Section 3004 of the Revised Code of Delaware, 1915, provided—

A marriage may be annulled for any of the following causes existing at the time of the marriage: * * * (d) fraud, * * * at the suit of the innocent and injured party, unless the marriage has been confirmed by the acts of the injured party. * * *

Another law, section 2992 of the code, as amended by Laws 1921, chapter 182, contained the following:

* * * It shall be unlawful for * * * a person who is venereally diseased, or a person who is suffering from any other communicable disease the nature of which is unknown to the other party to the proposed marriage, to marry.

The latter statute also provided that such a forbidden marriage should be voidable at the instance of the innocent party.

The plaintiff husband petitioned for an annulment of his marriage, basing his action on the grounds set forth in the above-quoted statutes. It was alleged in the petition that the defendant at the

time of the marriage had syphilis, that the plaintiff was ignorant of her condition until after the marriage, and that such marriage had not been confirmed by him after he learned the true facts. Medical testimony showed that the defendant at the time of the marriage had advanced syphilis and that she must, therefore, have known that she was afflicted with a serious venereal disease. The superior court granted annulment on both grounds, saying:

This court in *Williams* v. *Williams*, 2 W. W. Harr (32 Del.) 39, 118 A. 638, held that fraud, constituting a ground for annulling a marriage under the Revised Code of 1915, section 3004, paragraph d, must be fraud which went to the very essence of the marriage contract. In this case, the fraud alleged and proved by the plaintiff does go to the essence of the contract relation. The authorities are uniform in holding that the concealment of a venereal disease of a serious nature and incurable in character constitutes a valid ground for annulment of marriage on the ground of fraud. [Citations.]

2d. The petitioner has brought himself clearly within the provisions of the cited statute set forth as the second ground for annulment. It is true that the cause of action is not listed among the causes set forth in the divorce statute as a ground for annulment of marriage, but by act of the legislature it is expressly stated that it is unlawful for any person who is venereally diseased to marry and that the marriage at the instance of the innocent party is voidable. The plaintiff has been proven to have been the innocent party and the defendant is proven to have been afflicted at the time of the marriage with an incurable case of syphilis. Under the statute the marriage is voidable. While the statute is silent as to the form of action to be made use of by the injured party, I think it clear that annulment is the proper remedy.

DEATHS DURING WEEK ENDED MAY 20, 1933

[From the Weekly Health Index issued by the Bureau of the Census, Department of Commerce]

	Week ended May 20, 1933	Corresponding week, 1932
Data from 85 large cities of the United States:		
Total deaths	7,553	7,963
Deaths per 1,000 population, annual basis	10.6	11.4
Deaths under 1 year of age	497	673
Deaths under 1 year of age per 1,000 estimated live births [1]	41	56
Deaths per 1,000 population, annual basis, first 20 weeks of year	11.8	12.4
Data from industrial insurance companies:		
Policies in force	68,086,402	73,132,558
Number of death claims	12,658	13,796
Death claims per 1,000 policies in force, annual rate	9.7	9.9
Death claims per 1,000 policies, first 20 weeks of year, annual rate	10.8	10.5

[1] 81 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended May 27, 1933, and May 28, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended May 27, 1933, and May 28, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended May 27, 1933	Week ended May 28, 1932	Week ended May 27, 1933	Week ended May 28, 1932	Week ended May 27, 1933	Week ended May 28, 1932	Week ended May 27, 1933	Week ended May 28, 1932
New England States:								
Maine	8	1	5	1	6	253	1	0
New Hampshire	1	2			100	21	1	0
Vermont	1				2	269	0	0
Massachusetts	20	34		4	736	1, 232	2	1
Rhode Island	1	3			2	43	0	0
Connecticut	2	6	2	3	226	273	1	0
Middle Atlantic States:								
New York	80	92	[1] 9	[1] 13	2, 597	2, 720	6	4
New Jersey	26	40	2	5	1, 419	1, 120	3	0
Pennsylvania	34	78			1, 348	1, 578	3	6
East North Central States:								
Ohio	9	15	8	5	469	808	0	0
Indiana	16	23	17	26	272	208	4	2
Illinois	26	51	27	32	802	821	14	2
Michigan	26	9	1	11	930	3, 326	2	2
Wisconsin	2	9	17	14	332	1, 617	1	2
West North Central States:								
Minnesota [2]	3	6	2		588	46	0	2
Iowa	2	7			20	8	0	0
Missouri	20	23	1	3	305	78	8	0
North Dakota	3	6			113	115	0	0
South Dakota	2	4			17	8	0	1
Nebraska	8	13			171	1	1	1
Kansas	7	4	1	1	244	307	1	0
South Atlantic States:								
Delaware	2				15	2	0	0
Maryland [3]	7	10	5	4	63	41	0	0
District of Columbia		3			21	18	1	1
Virginia [2]	13				241		0	
West Virginia	7	10	1	11	136	436	1	3
North Carolina	8	12	21	25	600	703	0	3
South Carolina [4]	9	6	130	355	214	134	0	0
Georgia [4]	10	9		92	156	95	2	0
Florida	5	8	1	1	18	3	1	0
East South Central States:								
Kentucky	4	4	20	24	113	63	1	1
Tennessee		6	9	52	150	11	1	4
Alabama [4]	4	7	17	13	86	6	0	3
Mississippi	2	5					0	1

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended May 27, 1933, and May 28, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended May 27, 1933	Week ended May 28, 1932	Week ended May 27, 1933	Week ended May 28, 1932	Week ended May 27, 1933	Week ended May 28, 1932	Week ended May 27, 1933	Week ended May 28, 1932
West South Central States:								
Arkansas	5	1	9	1	425		1	0
Louisiana	13	35	20	4	23	8	0	2
Oklahoma [5]	5	10	12	10	110	19	0	0
Texas [4]	43	16	56	13	684	30	0	0
Mountain States:								
Montana [2]				3	50	56	0	0
Idaho [2]		3		2	12	1	0	0
Wyoming [2]	1	1			6	37	0	0
Colorado [2]	5	5	23		7	68	0	1
New Mexico	9	5			12	25	0	0
Arizona	3	2		2	103		1	1
Utah [3]			2		31		0	1
Pacific States:								
Washington	8	9			64	232	3	0
Oregon [2]		2	20	19	57	210	0	2
California	31	57	22	40	1,255	550	2	1
Total	481	647	460	789	15,351	17,595	57	47

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended May 27, 1933	Week ended May 28, 1932	Week ended May 27, 1933	Week ended May 28, 1932	Week ended May 27, 1933	Week ended May 28, 1932	Week ended May 27, 1933	Week ended May 28, 1932
New England States:								
Maine	0	0	25	21	0	0	1	2
New Hampshire	0	0	14	22	0	0	0	0
Vermont	0	0	13	6	0	0	0	0
Massachusetts	4	1	406	469	0	0	4	4
Rhode Island	0	0	18	45	0	0	0	0
Connecticut	0	0	85	127	2	0	1	2
Middle Atlantic States:								
New York	2	4	651	1,322	0	0	5	12
New Jersey	1	2	212	326	0	0	12	1
Pennsylvania	0	2	711	649	0	0	6	8
East North Central States:								
Ohio	1	0	416	143	6	8	9	3
Indiana	0	0	92	51	1	10	17	2
Illinois	0	2	419	294	7	7	14	11
Michigan	1	1	356	431	0	9	1	6
Wisconsin	2	1	128	66	3	1	8	2
West North Central States:								
Minnesota [2]	0	0	80	103	1	4	1	1
Iowa	0	0	24	34	54	16	3	4
Missouri	0	0	66	41	2	1	10	0
North Dakota	0	2	6	4	3	3	1	0
South Dakota	1	1	8	6	0	1	3	0
Nebraska	0	0	24	11	3	15	2	1
Kansas	0	0	81	31	2	5	0	6
South Atlantic States:								
Delaware	0	0	15	18	0	0	2	1
Maryland [3]	0	0	106	80	0	0	8	8
District of Columbia	0	0	10	17	2	0	0	0
Virginia [2]	0		82		0		8	
West Virginia	1	0	25	32	0	0	7	5
North Carolina	0	1	85	23	2	5	12	8
South Carolina [4]	0	1	2	3	2	1	21	12
Georgia [4]	0	2	1	8	1	0	16	87
Florida	1	0	3	2	0	1	2	4
East South Central States:								
Kentucky	1	0	60	38	4	7	26	8
Tennessee	0	1	17	7	0	7	4	14
Alabama [4]	0	0	5	4	0	13	12	5
Mississippi	0	1	2	5	0	11	7	2

See footnotes at end of table

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended May 27, 1933, and May 28, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended May 27, 1933	Week ended May 28, 1932	Week ended May 27, 1933	Week ended May 28, 1932	Week ended May 27, 1933	Week ended May 28, 1932	Week ended May 27, 1933	Week ended May 28, 1932
West South Central States:								
Arkansas	0	0	1	1	0	6	8	3
Louisiana	0	0	7	13	1	0	21	20
Oklahoma [5]	0	1	7	6	22	34	9	1
Texas [4]	1	1	50	14	10	31	26	6
Mountain States:								
Montana [2]	0	1	35	21	0	2	2	0
Idaho [2]	0	0	0	1	5	0	1	0
Wyoming [2]	0	0	9	2	0	1	0	1
Colorado [2]	0	0	28	19	0	1	1	5
New Mexico	0	0	7	8	0	1	1	2
Arizona	0	0	6	4	0	0	1	0
Utah [3]	0	0	4	8	0	0	0	0
Pacific States:								
Washington	1	0	44	22	2	6	1	4
Oregon [2]	1	0	22	6	19	6	1	1
California	2	1	150	152	34	20	2	26
Total	20	26	4,469	4,716	188	233	292	244

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended May 27, 1933, 21 cases: 1 case in Minnesota, 2 cases in Virginia, 5 cases in Montana, 1 case in Idaho, 8 cases in Wyoming, 3 cases in Colorado, and 1 case in Oregon.
[3] Week ended Friday.
[4] Typhus fever, week ended May 27, 1933, 11 cases: 1 case in South Carolina, 3 cases in Georgia, 4 cases in Alabama, and 3 cases in Texas.
[5] Figures for 1933 are exclusive of Oklahoma City and Tulsa, and for 1932 are exclusive of Tulsa only.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week:

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
March 1933										
Hawaii Territory	1	11	55		3		0	2	0	53
April 1933										
California	13	194	158	5	5,141	7	9	660	171	25
Georgia	8	41	465	99	530	56		36		28
Kansas	2	35	4		1,421		1	212	6	7
Louisiana	2	40	42	23	159	17	1	40	1	61
Montana	1	4	33		161		0	60	2	10
Nevada			27				0	35	1	2
North Carolina	5	73	79		2,708	62	1	232	1	29
Oklahoma [1]	14	27	158	95	742	12	0	62	54	4
Texas	14	349	1,106	352		57	2	337		54
Washington	1	20	65		268		2	175	55	3
Wisconsin	5	22	218		2,192		3	667	31	15

[1] Exclusive of Oklahoma City and Tulsa.

March 1933

Hawaii Territory:	Cases
Chicken pox	110
Conjunctivitis, acute	13
Conjunctivitis, follicular	20
Dysentery, bacillary	2
Hookworm disease	51
Impetigo contagiosa	2
Leprosy	12
Mumps	23
Streptococcic sore throat	3
Tetanus	3
Trachoma	6
Undulant fever	1
Whooping cough	283

April 1933

	Cases
Actinomycosis:	
California	2
Botulism:	
Montana	3
Chicken pox:	
California	2,652
Georgia	231
Kansas	473
Louisiana	31
Montana	192
Nevada	6
North Carolina	579
Oklahoma [1]	126
Washington	647
Wisconsin	2,470
Conjunctivitis:	
Georgia	2
Oklahoma [1]	3
Dysentery:	
California (amebic)	19
California (bacillary)	10
Georgia	20
North Carolina	1
Oklahoma [1]	4
Food poisoning:	
California	11
German measles:	
California	64
Kansas	240
Montana	2
North Carolina	43
Washington	14
Wisconsin	21
Granuloma, coccidioidal:	
California	9
Hookworm disease:	
Georgia	394
Louisiana	12

April 1933—Continued

	Cases
Impetigo contagiosa:	
Montana	7
Leprosy:	
California	2
Washington	1
Lethargic encephalitis:	
California	1
Kansas	2
Texas	4
Washington	2
Wisconsin	1
Mumps:	
California	1,237
Georgia	379
Kansas	710
Louisiana	3
Montana	15
Oklahoma [1]	31
Washington	320
Wisconsin	935
Ophthalmia neonatorum:	
California	4
Oklahoma [1]	1
Wisconsin	1
Paratyphoid fever:	
Georgia	2
Louisiana	3
Texas	8
Psittacosis:	
California	1
Puerperal septicemia:	
Washington	1
Rabies in animals:	
California	35
Louisiana	3
Washington	9
Rocky Mountain spotted fever:	
California	1
Montana	14
Nevada	3
Washington	2
Scabies:	
Kansas	3
Oklahoma [1]	16
Septic sore throat:	
California	12
Georgia	24
Kansas	4
Montana	1
North Carolina	5
Oklahoma [1]	20
Silicosis:	
Montana	1

April 1933—Continued

	Cases
Tetanus:	
California	7
Georgia	4
Louisiana	4
Washington	1
Tick paralysis:	
Montana	1
Trachoma:	
California	29
Georgia	15
Kansas	1
Montana	1
Oklahoma [1]	14
Wisconsin	1
Trichinosis:	
California	4
Tularæmia:	
California	1
Georgia	2
Kansas	2
Louisiana	2
Montana	4
Nevada	1
North Carolina	3
Oklahoma [1]	1
Typhus fever:	
Georgia	22
Louisiana	1
North Carolina	1
Undulant fever:	
California	13
Georgia	5
Kansas	2
Louisiana	1
North Carolina	1
Oklahoma [1]	4
Washington	3
Wisconsin	6
Vincent's angina:	
Kansas	1
Oklahoma [1]	8
Washington	1
Whooping cough:	
California	2,403
Georgia	252
Kansas	350
Louisiana	77
Montana	29
Nevada	4
North Carolina	576
Oklahoma [1]	44
Washington	31
Wisconsin	665

[1] Exclusive of Oklahoma City and Tulsa.

WEEKLY REPORTS FROM CITIES

City reports for week ended May 20, 1933

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	0	------	0	0	0	3	0	0	0	1	18
New Hampshire:											
Concord	0	------	0	0	2	8	0	1	0	0	11
Manchester	0	------	0	0	0	0	0	1	0	0	6
Nashua	0	------	0	0	0	0	0	0	0	0	--------
Vermont:											
Barre	0	------	0	0	0	0	0	0	0	3	4
Burlington	1	------	0	0	0	1	0	0	0	0	5
Massachusetts:											
Boston	15	------	1	199	35	81	0	9	2	28	221
Fall River	0	1	1	0	1	4	0	1	0	7	--------
Springfield	0	------	1	7	0	11	0	0	0	7	35
Worcester	0	------	0	10	2	23	0	1	0	10	47
Rhode Island:											
Providence	2	------	0	0	4	72	0	3	0	13	65

City reports for week ended May 20, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Connecticut:											
Bridgeport	0	2	0	28	2	22	0	2	0	0	21
Hartford	0		0	4	0	28	0	2	9	4	26
New Haven	0		0	8	2	3	0	0	0	22	27
New York:											
Buffalo	9		1	52	15	39	0	6	0	35	133
New York	44	11	5	1,300	139	245	0	96	3	114	1,478
Rochester	0		0	3	4	26	0	0	0	6	59
Syracuse	0		0	3	1	10	0	0	0	11	40
New Jersey:											
Camden	4		0	19	1	13	0	0	0	0	18
Newark	0	1	0	161	7	13	0	10	0	48	89
Trenton	0		0	13	0	9	0	2	0	6	34
Pennsylvania:											
Philadelphia	4	2	2	443	28	114	0	26	1	5	464
Pittsburgh	0	2	2	16	9	85	0	5	0	34	124
Reading	0		0	15	2	8	0	0	1	6	26
Scranton	2			0		4	0		0	0	
Ohio:											
Cincinnati	1		1	6	6	19	0	4	0	8	115
Cleveland	7	35	1	2	15	161	0	9	1	30	168
Columbus	0	2	2	9	5	27	0	4	1	0	58
Toledo	0		0	213	8	118	0	10	0	7	89
Indiana:											
Fort Wayne	6		0	1	2	6	0	0	0	0	23
Indianapolis	2		0	141	4	5	0	6	0	10	
South Bend	0		0	3	2	1	0	1	0	2	17
Terre Haute	0		0	12	3	9	0	2	0	1	14
Illinois:											
Chicago	2	1	3	505	44	301	0	50	1	40	664
Cicero	0		0	5	0	4	0	0	0	0	3
Springfield	2		0	0	2	6	0	0	0	0	16
Michigan:											
Detroit	19		0	350	15	152	0	28	0	128	238
Flint	1	9	0	17	5	7	0	0	0	0	23
Grand Rapids	0		0	6	1	8	0	1	0	12	22
Wisconsin:											
Kenosha	0		0	0	0	2	0	0	0	33	2
Madison	0			87		1	0		0	3	
Milwaukee	0	1	1	6	3	38	0	5	0	77	87
Racine	0		0	0	1	8	0	0	0	8	10
Superior	0		0	0	0	0	0	1	0	10	12
Minnestoa:											
Duluth	0		1	9	2	0	0	3	0	60	29
Minneapolis	1		0	55	3	47	0	2	1	36	92
St. Paul	0		0	271	2	24	0	4	0	84	52
Iowa:											
Des Moines	2			0		9	5		0	0	18
Sioux City	0			4		1	0		0	5	
Waterloo	0			1		1	0		0	0	
Missouri:											
Kansas City	1		1	45	5	33	0	6	0	1	89
St. Joseph	0		0	27	6	0	0	2	0	1	43
St. Louis	12		1	128	5	12	0	6	3	12	149
North Dakota:											
Fargo	0		0	0	1	0	0	1	0	0	8
Grand Forks	0		0	0	0	1	0	0	0	0	
South Dakota:											
Aberdeen	0		0	0	0	0	0	0	0	0	
Nebraska:											
Omaha	1		0	134	5	2	0	1	0	9	50
Kansas:											
Topeka	0		0	113	1	2	0	1	0	2	17
Wichita	0		0	1	0	0	0	1	0	5	31
Delaware:											
Wilmington	0		0	6	2	4	0	1	0	1	25
Maryland:											
Baltimore	0	2	0	7	7	67	0	20	1	41	189
Cumberland	1		0	9	0	1	0	0	0	0	11
Frederick	0		0	0	0	0	0	0	0	1	1
District of Col.:											
Washington	0		0	19	8	8	0	9	1	9	129

City reports for week ended May 20, 1933—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Virginia:											
Lynchburg	2	------	0	28	0	0	0	1	0	6	14
Norfolk	0	------	0	8	2	2	0	1	0	2	20
Richmond	5	------	2	8	2	3	0	0	1	1	50
Roanoke	0	------	0	13	0	3	0	1	1	3	15
West Virginia:											
Charleston	0	1	0	0	0	0	0	0	0	0	17
Huntington	0	------	------	0	------	2	0	------	0	0	------
Wheeling	0	------	0	5	4	2	0	0	0	7	16
North Carolina:											
Raleigh	0	------	0	3	1	0	0	0	0	2	5
Wilmington	0	------	0	31	3	0	0	0	0	0	13
Winston-Salem	0	------	0	16	0	2	1	0	0	2	11
South Carolina:											
Charleston	1	13	0	0	0	0	0	3	0	0	20
Columbia	0	------	0	0	2	0	0	1	0	0	14
Greenville	0	------	0	4	3	0	0	1	0	1	11
Georgia:											
Atlanta	0	12	1	44	5	0	0	3	2	27	72
Brunswick	0	------	0	0	0	0	0	0	0	0	3
Savannah	0	1	0	1	1	0	0	0	1	0	33
Florida:											
Miami	0	------	0	0	0	1	0	0	0	7	10
Tampa	2	1	1	0	2	0	0	2	0	1	18
Kentucky:											
Ashland	0	------	0	3	0	1	0	0	0	3	------
Lexington	0	------	0	4	0	2	0	2	0	2	15
Louisville	0	------	0	13	8	9	0	2	0	9	80
Tennessee:											
Nashville	0	------	0	8	2	2	0	0	0	7	35
Alabama:											
Birmingham	1	------	0	1	4	3	0	4	0	3	51
Mobile	1	------	0	12	2	0	0	0	0	2	18
Montgomery	0	------	------	8	------	0	0	------	0	7	------
Arkansas:											
Fort Smith	0	------	------	1	------	0	0	------	0	5	------
Little Rock	1	------	0	141	0	0	[1] 2	2	0	0	2
Louisiana:											
New Orleans	5	3	5	12	6	6	0	6	1	8	125
Shreveport	0	------	0	3	0	0	0	1	0	0	33
Oklahoma:											
Oklahoma City	0	26	0	36	4	0	0	4	0	0	33
Tulsa	0	------	------	44	------	1	2	------	0	13	------
Texas:											
Dallas	2	------	0	------	5	6	0	1	1	13	59
Fort Worth	1	------	1	5	3	1	0	1	0	0	38
Galveston	0	------	0	0	2	2	0	1	0	0	13
Houston	2	------	0	3	7	1	0	7	0	4	62
San Antonio	1	------	0	25	3	1	0	6	0	1	80
Montana:											
Billings	0	------	0	1	0	0	0	0	0	0	5
Great Falls	0	------	0	0	0	0	0	0	0	4	5
Helena	0	------	0	0	0	0	0	0	0	0	3
Missoula	0	------	0	26	0	1	0	0	0	0	4
Idaho:											
Boise	0	------	0	3	0	0	1	0	0	1	3
Colorado:											
Denver	1	23	0	2	6	21	0	4	0	1	68
Pueblo	0	------	0	0	1	0	0	0	0	0	10
New Mexico:											
Albuquerque	0	------	0	0	0	0	0	2	1	9	8
Utah:											
Salt Lake City	1	------	0	16	1	2	0	0	0	15	26
Nevada:											
Reno	1	------	0	0	1	0	0	1	0	0	3
Washington:											
Seattle	1	------	------	11	------	23	0	------	0	6	------
Spokane	0	------	------	4	------	0	1	------	0	0	------
Tacoma	0	------	0	1	2	6	1	2	0	0	33
Oregon:											
Portland	1	------	0	1	1	7	4	2	0	4	66
Salem	0	2	------	5	------	0	0	------	0	0	------
California:											
Los Angeles	24	12	0	519	15	52	14	25	0	80	292
Sacramento	0	------	0	2	0	0	0	3	2	55	24
San Francisco	1	------	1	4	11	7	0	6	6	94	152

[1] Nonresident.

City reports for week ended May 20, 1933—Continued

State and city	Meningococcus meningitis		Polio-myelitis cases
	Cases	Deaths	
New York:			
New York	4	2	1
Pennsylvania:			
Pittsburgh	0	1	0
Indiana:			
Indianapolis	1	0	0
Illinois:			
Chicago	13	6	0
Michigan:			
Detroit	1	1	0
Wisconsin:			
Milwaukee	3	0	0
Minnesota:			
St. Paul	1	1	0
Missouri:			
St. Joseph	0	1	0
St. Louis	2	1	0
Delaware:			
Wilmington	0	0	1
South Carolina:			
Columbia	0	1	0
Louisiana:			
New Orleans	0	0	1
Oklahoma:			
Oklahoma City	2	0	0
California:			
Los Angeles	1	0	3
San Francisco	1	1	0

Lethargic encephalitis.—Cases: Philadelphia, 1; Milwaukee, 1; Wichita, 1; Birmingham, 1.
Pellagra.—Cases: Winston-Salem, 2; Charleston, S.C., 3; Savannah, 2; Lexington, 1; New Orleans, 1.
Typhus fever.—Cases: Springfield, Ill., 1; Savannah, 1.

FOREIGN AND INSULAR

CUBA

Habana—Communicable diseases—Four weeks ended May 20, 1933.—During the 4 weeks ended May 20, 1933, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	20	8	Scarlet fever	9	2
Leprosy	1	1	Tuberculosis	23	6
Malaria	5		Typhoid fever	11	7
Rabies	2	2			

Provinces—Communicable diseases—Four weeks ended April 1, 1933.—During the 4 weeks ended April 1, 1933, cases of certain communicable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana	Matanzas	Santa Clara	Camaguey	Oriente	Total
Chicken pox		4	1	2	1		8
Diphtheria		6	2	4		2	14
Malaria	46	10	283	41	42	31	453
Measles		1	2	9			12
Scarlet fever		1					1
Tuberculosis	3	14	5	14	7	3	46
Typhoid fever	1	16	7	20	8	17	69

CZECHOSLOVAKIA

Communicable diseases—March 1933.—During the month of March 1933 certain communicable diseases were reported in Czechoslovakia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	5	3	Paratyphoid fever	23	1
Cerebrospinal meningitis	13	6	Poliomyelitis	7	1
Chicken pox	389		Puerperal fever	52	21
Diphtheria	2,669	133	Scarlet fever	1,885	20
Dysentery	6		Trachoma	155	
Influenza	2,722	45	Typhoid fever	371	27
Lethargic encephalitis	2	2	Typhus fever	9	1
Malaria	12				

SWITZERLAND

Vital statistics—Years 1931 and 1932.—The following table shows the number of births and deaths, together with deaths from certain diseases, reported in Switzerland during the years 1931 and 1932.

	1931	1932		1931	1932
Number of births	68, 249	68, 644	Number of deaths from—Contd.	1, 855	1, 921
Number of deaths	49, 414	49, 910	Influenza	84	87
Number of deaths under 1 year of age	3, 374	3, 499	Measles	3, 127	2, 853
Number of deaths from—			Pneumonia	118	140
Arteriosclerosis	5, 004	5, 402	Puerperal fever	34	31
Cancer	5, 671	5, 837	Scarlatina	3, 768	3, 528
Diphtheria	127	92	Tuberculosis, pulmonary	1, 206	1, 219
Enteritis	380	395	Tuberculosis, other forms	32	27
Heart disease	6, 209	6, 045	Typhoid fever	88	185
			Whooping cough		

NOTE.—The population of Switzerland, according to the 1930 census, was 4,077,000.

YUGOSLAVIA

Communicable diseases—April 1933.—During the month of April 1933 certain communicable diseases were reported in Yugoslavia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	24		Poliomyelitis	2	2
Cerebrospinal meningitis	15	10	Scarlet fever	154	9
Diphtheria and croup	483	63	Sepsis	12	4
Dysentery	17	1	Tetanus	27	14
Erysipelas	136	10	Typhoid fever	182	30
Measles	494	12	Typhus fever	31	6
Paratyphoid fever	1				

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

(NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for May 26, 1933, pp. 586–596. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued June 30, 1933, and thereafter, at least for the time being, in the issue published on the last Friday of each month.)

Cholera

Philippine Islands.—During the week ended May 27, 1933, cholera was reported in the Philippine Islands as follows: Leyte Province, 4 cases, 4 deaths; Bohol Province, 15 cases, 12 deaths; Pampanga Province, 1 case, 1 death.

Yellow Fever

Gold Coast.—During the week ended May 20, 1933, a case of yellow fever was reported at Oda, Gold Coast.

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UNITED STATES TREASURY DEPARTMENT

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UNITED STATES PUBLIC HEALTH SERVICE

HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst. Surg. Gen. R. C. WILLIAMS, *Chief of Division*

The PUBLIC HEALTH REPORTS are issued weekly by the United States Public Health Service through its Division of Sanitary Reports and Statistics, pursuant to acts of Congress approved February 15, 1893, and August 14, 1912.

They contain: (1) Current information of the prevalence and geographic distribution of preventable diseases in the United States insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other communicable diseases throughout the world. (2) Articles relating to the cause, prevention, or control of disease. (3) Other pertinent information regarding sanitation and the conservation of public health.

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PUBLIC HEALTH REPORTS

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A NONMANNITOL-FERMENTING TYPE OF S. ENTERITIDIS PRODUCING CLINICAL REACTIONS SIMILAR TO THOSE OF ROCKY MOUNTAIN SPOTTED FEVER VIRUS

By L. F. BADGER, *Passed Assistant Surgeon, United States Public Health Service*

During the summer of 1931 an epizootic occurred among our stock guinea pigs (at the National Institute of Health), killing many of them. The disease in the guinea pig was characterized clinically by fever only. Post-mortem examination showed rather marked congestion of the abdominal viscera, with a spleen enlarged two or three times, darker than normal, and smooth. While febrile, some of these animals were bled from the heart and culture medium was inoculated with the whole blood. In this way there was isolated a strain of *S. enteritidis* which differed from the strains of *S. enteritidis* that have been described in that it failed to ferment mannitol. After more than 1 year from the date of isolation, the nonmannitol-fermenting characteristic of this organism persisted. For the purpose of this discussion, this strain of *S. enteritidis* will be referred to as *S. enteritidis* 288. A description of this organism follows:

Gram-negative motile rod with peritrichous flagella; grows readily on ordinary culture media; in broth grows readily at room temperature and luxuriantly at 37.0° C.; produces a faint yellow growth on potato in 24 hours; does not liquefy gelatin nor produce indol; hydrogen sulphide is produced in 24 hours; reduces nitrates; in litmus milk it produces acid in 24 hours, less acid in 48 hours, and in 96 hours the milk is alkaline.

Fermentation reactions.—Acid and gas in the monosaccharides, arabinose, rhamnose, xylose, galactose, glucose, mannose, and levulose. In the disaccharide maltose, acid and gas are produced, while lactose, saccharose, and trehalose are unaffected. The trisaccharides, melezitose, and raffinose are unchanged. Acid is produced in the polysaccharides, dextrose, and starch; inulin is unchanged. Of the alcohols, erythretol, adonitol, inositol, and mannitol are unchanged, while acid is produced in glycerol, and acid and gas in dulcitol and sorbitol. The glucocides amygdalin and salicin are unchanged.

Serology.—A study was made of the serological relation between *S. enteritidis* 288 and two strains of *S. enteritidis*, two strains of *S. aertrycke*,

and one strain each of *S. paratyphi*, *S. schotmuelleri*, and *B. paratyphosus* C. Sera of rabbits which had been inoculated with *S. enteritidis* 288 agglutinated the *enteritidis* and not the *aertrycke* and paratyphoid organisms. *S. enteritidis* 288 was agglutinated by *enteritidis* sera and not by *aertrycke* sera.

Reaction in laboratory animals.—Male guinea pigs were inoculated both with a 24-hour-old broth culture and with a suspension of the organism. The suspensions were prepared from a 24-hour growth on agar slants and were adjusted to a turbidity of 500 parts per million. Following these inoculations the guinea pigs became febrile in from 24 to 48 hours, with maximum temperature ranging from 40° C. to 41.5° C. In addition to the febrile reaction, 25 percent of the animals had definite involvement of the external genitalia characterized by erythema and edema of the scrotum. The post-mortem examination, made in from 2 to 6 days after the onset of symptoms, showed the peritoneum injected and moist; serous fluid in the peritoneal cavity in some and purulent fluid in a few. The spleen varied from slightly to three times enlarged, was darker than normal, smooth, and covered with varying amounts of exudate. The liver was possibly slightly enlarged and darker than normal in some, and in the majority of instances was covered with a filmy exudate. The testicles were normal in size, the vessels of the tunica injected, and in a few instances there was a slight amount of exudate on the testicles.

S. enteritidis 288 could be passed in series in guinea pigs and was carried in this manner for five generations. The transfers were made with whole cardiac blood in doses of 2 or 3 cc, inoculated intraperitoneally. The reactions in the guinea pig following such inoculations differed somewhat from those produced by inoculations of pure cultures of the organisms.

Following inoculations with guinea pig passage *S. enteritidis* 288, the animals became febrile in from 2 to 6 days. The duration of the febrile period ranged from 4 to 14 days, with a maximum temperature of from 40° C. to 41° C. The scrotal lesion seen following inoculation of the pure culture occasionally occurred in guinea pigs inoculated with the guinea pig passage organism. Post-mortem examinations made on the third or fourth day of fever revealed injection of the peritoneum and a spleen enlarged three to four times, darker than normal, and smooth. No fluid or pus was observed in the peritoneal cavity. The mortality rate of guinea pigs inoculated with the guinea pig passage organism was 20 percent.

S. enteritidis 288 produces in the guinea pig a complete immunity to subsequent inoculations of the same organism.

Three rabbits were inoculated with 0.25 to 0.50 cc of a 24-hour broth culture. Each of the rabbits died within 24 hours.

Twenty-two rabbits were inoculated with guinea pig passage *S. enteritidis* 288 by means of whole cardiac blood obtained from guinea pigs in the third or fourth day of fever. The injections were made with doses varying from 3 to 8 cc of the blood. Of the 22 rabbits, 2 died too soon to determine any reaction, 14 showed no (or indefinite) reaction, and 6 responded with definite febrile reactions. One of the rabbits reacting with a definite febrile course had a marked lesion of the external genitalia characterized by erythema, œdema and ulceration of the scrotum, and enlargement of the testicles

CONFUSION WITH ROCKY MOUNTAIN SPOTTED FEVER AND TYPHUS

At the time when the epizootic was occurring among the stock guinea pigs, experiments with the virus of the eastern type of Rocky Mountain spotted fever were in progress. The presence of this *S. enteritidis* led to confusion. (1) (2).

In the guinea pig, fever is the only clinical manifestation produced by the virus of Rocky Mountain spotted fever isolated from cases occurring in the eastern part of the country, and congestion of the abdominal viscera and enlargement of the spleen are the only gross pathological findings. Rarely erythema and œdema of the scrotum have occurred, but attempts to transmit this involvement to subsequent generations have failed

In the rabbit the eastern virus of spotted fever produces a febrile reaction, and in some male rabbits a scrotal lesion in addition to the fever. This scrotal lesion is characterized by erythema and œdema of the scrotum which frequently progresses to ulceration and enlargement of the testicles.

From the descriptions given, it is evident that the reactions produced in the guinea pig and rabbit by *S enteritidis* 288 simulate those produced by the eastern virus of Rocky Mountain spotted fever. The scrotal lesion produced in the guinea pig by *S. enteritidis* 288 is, in appearance, more like that produced by the virus of endemic typhus than by the western virus of Rocky Mountain spotted fever.

On account of the confusing clinical reactions in guinea pigs, the immunological relation between this strain of *S. enteritidis* and the viruses of spotted fever and typhus was studied. In testing the immunity of recovered typhus and spotted fever guinea pigs to the *S. enteritidis*, whole cardiac blood of guinea pigs infected with this organism was used. In each instance the *S. enteritidis* was recovered from the blood used in making the inoculations.

Twenty-seven guinea pigs immune either to the western virulent virus or the eastern spotted fever virus, with 49 fresh guinea pigs as controls, were inoculated with this strain of *S. enteritidis*. Seventy and three-tenths percent of the immune animals failed to react

(apparently immune), while but 8.1 percent of the fresh controls failed to react

Thirty-two guinea pigs immune either to the endemic or epidemic typhus viruses, with 45 fresh guinea pigs as controls, were inoculated with this strain of *S. enteritidis*. Thirty-seven and five-tenths per-cent of the immune animals failed to react (apparently immune), while but 6.8 per cent of the fresh controls failed to react.

When the guinea pigs immune to *S. enteritidis* were tested for immunity to the viruses of spotted fever and typhus, different results were obtained.

Nineteen guinea pigs immune to *S. enteritidis*, with 32 fresh guinea pigs as controls, were inoculated with viruses of spotted fever. Ten and five-tenths percent [3] of the immune animals failed to react, while none of the fresh controls failed to react.

Seven guinea pigs immune to *S. enteritidis*, with 14 fresh guinea pigs as controls, were inoculated with typhus viruses. None of the animals failed to react.

SUMMARY

A nonmannitol-fermenting strain of *S. enteritidis* has been isolated from the cardiac blood of guinea pigs during an epizootic.

This strain of *S. enteritidis* produces in the guinea pig and rabbit clinical manifestations similar to those produced by the virus of Rocky Mountain spotted fever isolated from cases occurring in the eastern part of the United States.

An apparently nonspecific immunity occurs between this strain of *S. enteritidis* and the viruses of Rocky Mountain spotted fever and typhus.

This apparent nonspecific immunity has occurred only when guinea pigs immune to the viruses of spotted fever and typhus were inoculated with this strain of *S. enteritidis* and not when immune *S. enteritidis* guinea pigs were inoculated with the viruses of spotted fever and typhus.

This strain of enteritidis, and perhaps other organisms, may cause confusion in isolating a strain of spotted fever or typhus virus.

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[3] Not all fresh guinea pigs react to inoculations with viruses of spotted fever and typhus. In a series of 714 fresh guinea pigs, 7 2 percent failed to react to the eastern spotted fever virus, and in a series of 200 fresh guinea pigs 11 percent failed to react to a virus of endemic typhus

EXPERIMENTAL STUDIES OF NATURAL PURIFICATION IN POLLUTED WATERS

VII. THE SELECTION OF A DILUTION WATER FOR BACTERIOLOGICAL EXAMINATIONS

By C. T. Butterfield, *Principal Bacteriologist, Stream Pollution Investigations, United States Public Health Service*

In making quantitative determinations of the number of bacteria in a sample which will grow on plates or in tubes, it is usually necessary to dilute a portion of the sample with sterile water to reduce the bacterial content to numbers which can be accurately enumerated. The dilution water may influence bacterial counts thus obtained in at least two ways: It may be bactericidal, and it may contain precipitates which will appear as confusing particles, simulating bacterial colonies on the plates, when the counts are made. Tests for the presence of such interference should be made on the water after it has been sterilized and is ready for use, as the characteristics of a water are frequently changed by sterilization.

In the first (1905) and second (1912) editions of Standard Methods for the Examination of Water and Sewage (American Public Health Association) it is stated that either sterile tap water or distilled water may be used for dilution purposes in bacteriological work. In the third edition and all subsequent editions sterile tap water is recommended and distilled water is not mentioned.

At first thought it would seem that a tap water would be ideal for bacteriological dilution. Upon careful investigation, however, only a few tap waters are found to be entirely suitable. Well, or spring, waters as a rule contain iron and a fairly large amount of mineral salts which are held in solution by carbon dioxide in the water. Precipitates are frequently formed when these waters are exposed to air, and are practically always produced by sterilization with heat. The hydrogen ion concentration of such waters may be changed sufficiently by sterilization to make them bactericidal. Tap waters derived from surface sources are not constant in their composition. They vary not only in their natural mineral salt content but also from the effects of coagulation and chlorination.

In the actual field experience of this laboratory it has frequently been found necessary either to resort to waters other than tap water or to treat the tap water before it was used for bacteriological dilution, because the available tap supply was not suitable after sterilization. For instance, the hydrogen ion concentration of Cincinnati (Ohio) tap water is ordinarily so low after autoclaving, pH 8.6 to 9.5, that it is bactericidal unless it is allowed to stand for at least 48 hours before use to give it time to reach an equilibrium with the carbon dioxide in the laboratory air. In actual practice it is allowed to

stand for 96 hours before use. At times when the excess lime treatment is employed to avoid tastes and odors, the water as it comes from the tap is in the pH zone of 9.0 to 9.5, and greater difficulties are encountered. Additional evidence indicating the changes in hydrogen ion concentrations which are produced in waters when they are autoclaved is presented in Table 1. In this table are given the pH values of the various natural and synthetic waters used in this study, as observed before autoclaving, after autoclaving and cooling, and 48 hours after autoclaving. In eight of the eleven waters examined, changes in hydrogen ion concentrations of 0.5 to 1.8 pH were observed.

TABLE 1.—*Hydrogen ion concentration of various synthetic dilution waters and natural waters before and after sterilization by autoclave*

Water or source of water	Hydrogen ion concentration expressed in pH		
	Before sterilization	After autoclaving	48 hours after autoclaving
Distilled	6.7	[1] 8.5	7.2
Bicarbonate	8.0	9.2	8.9
Phosphate	7.3	7.4	7.4
Formula C	7.3	7.4	7.4
Cincinnati, Ohio	8.1	8.6	7.6
Pine Ridge, S. D	7.6	8.4	8.2
Lake Michigan	8.0	8.7	8.2
Charleston, S. C	6.4	7.3	7.3
Lawrence, Kans	7.8	8.2	8.1
Lynn, Mass	7.0	8.5	8.2
Springfield, Ill	7.9	8.6	8.2

[1] Distilled water changes to pH 7.2 to 7.4 within a short period after sterilization or immediately upon agitation.

Another factor that must be considered in the preparation of bacteriological dilution waters is the quality of the glassware in which the water is sterilized. Collins and Riffenburg (1925) have called attention to the dangers of pollution with materials dissolved from glass. Phosphate-buffered water, pH 7.2, autoclaved in pyrex glass containers, showed an unchanged final hydrogen ion concentration. A portion of the same water after sterilization in a bottle of poor quality glass had a pH of 8.7. Poorly buffered waters undergo still greater changes. All dilution bottles used in this study were tested by filling with distilled water, autoclaving, and then examining the water. The solution of material from glass is most rapid in distilled water. Bottles producing a persistent change in the hydrogen ion concentration of the water were not used.

Similar difficulties have been encountered in selecting a dilution water for use in biochemical oxygen demand determinations. In this instance the criterion for the suitability of the dilution water is even more exacting; for not only must the water be favorable to the continuous

viability of the biological factors concerned, but it must also be free from any substance which would add to the oxygen requirement of the sample or interfere chemically with the quantitative determination of oxygen. Considerable progress has been made toward the development of a dilution water for this purpose. Mohlman, Edwards, and Swope (1928) proposed a dilution water prepared by dissolving 0.5 gram of sodium bicarbonate per liter of distilled water. Later Mohlman (1930) has suggested that the bicarbonate content be reduced to 0.3 gram per liter. Theriault et al. (1931) have reviewed the results presented by these and other workers. In addition they made a comparative study of the oxygen demand results obtained when distilled water, bicarbonate water, and two synthetic waters (phosphate water[1] and Formula C[1] water) prepared by them were used for dilution. As a result of this study, and with a view to the eventual development of a dilution water for general use, they believe that it is desirable to standardize on the readily prepared phosphate dilution water.

As biochemical oxygen demand tests and bacteriological examintions are usually made in the same laboratory, it would be a decided step toward standardization and simplicity of operation if the same dilution water could be used for both procedures. With this object in view, a preliminary study on the selection of a suitable water has been made. In this study the results obtained with Cincinnati tap water, distilled water, bicarbonate water (300 p.p.m.), phosphate water, and Formula C water have been compared to determine the relative suitability of these waters for bacteriological dilution. In each instance the source water was also used as a sixth dilution water, that is, as each sample was received for examination a portion of it was withdrawn, measured into dilution bottles, sterilized, and used as a dilution water for that particular sample. All dilution waters except these source waters were sterilized at least 48 hours before they were used.

In making such a comparison it would be expected that some of the dilution waters might vary in their suitability, depending on the nature and the source of the water sample under examination. In order to test this possibility and to obtain information adapted for more general application, samples for examination, using these dilution

[1] The following stock solutions were used in the preparation of dilution waters:

(1) Phosphate buffer solution (34 0 grams KH_2PO_4 dissolved in 500 ml. of distilled water, adjusted to pH 7.2 with 1 M NaOH solution and made up to one liter with distilled water).

(2) Calcium chloride solution, 0.10 M (18.3 grams $CaCl_2.4H_2O$ per liter of distilled water).

(3) Magnesium sulphate solution, 0.04 M (9.9 grams $MgSO_4.7H_2O$ per liter of distilled water).

(4) Ferric chloride solution, 0.001 M (0.27 grams $FeCl_3.6H_2O$ per liter of distilled water).

Phosphate dilution water: The phosphate water was prepared by adding 1.25 ml. of stock phosphate buffer solution per liter of distilled water.

Formula C water: Formula C water was prepared by adding to each liter of phosphate dilution water stock solutions as follows: 0.1 M calcium chloride, 2.5 ml.; 0.04 M magnesium sulphate, 2.5 ml.; and 0.001 M ferric chloride, 0.5 ml.

waters, were obtained from (1) White Clay Creek, Pine Ridge Indian Agency, Pine Ridge, S.Dak.; (2) Lake Michigan, near the mouth of the Chicago River at Chicago, Ill.; (3) Goose Creek, at Charleston, S.C.; (4) Kansas River at Lawrence, Kans. (5) Saugus River watershed at Lynn, Mass.; (6) Sangamon River at Springfield, Ill., and (7) Ohio River at Cincinnati, Ohio. These are fairly representative of waters in the United States, with the exception of the extremely alkaline waters of the far West.

An attempt was made to determine the bacterial count, as observed in the various diluted samples, (1) immediately after the portion of the sample was added to the dilution water, (2) after it had been in the diluting water 15 minutes, and (3) again after a 30-minute exposure. Examinations were not made after longer periods, because in routine procedure the sample would not ordinarily remain in the dilution water for a greater time than 30 minutes before the diluted sample would be mixed with the culture medium.

METHODS

In carrying out these tests the sample was vigorously shaken, and then 1 ml. was withdrawn and added to the first dilution water. The time was noted. The mixture was then shaken vigorously and 1-ml. portions were withdrawn and placed in Petri dishes. Four plates were made of each dilution, and standardized pipettes were used. The plates were poured with agar at once and the time was noted. The diluted sample was then allowed to stand for 15 minutes before it was again vigorously shaken and portions withdrawn for plating. During this 15-minute period the process was repeated with the same sample for each of the dilution waters. The plants for the 15 and 30 minute periods were made in the same manner. The interval during which the portion of the diluted sample was in the Petri dish before agar was added did not exceed one minute. This avoided the adverse effects of sedimentation and evaporation which become a factor if portions of a sample are allowed to stand in plates for 15 minutes or over before the culture medium is added.

Three workers cooperated on each test. One acted as timekeeper, the second made the dilutions and added the 1-ml. portions to the Petri dishes, and the third looked after the agar and poured the plates.

The same agar was used throughout a given test. This agar was melted and cooled to 40° C. before the plating was started and was held at this temperature. Four plates were made of each dilution at each planting. Each count recorded in the tables represents the average of at least four plates from one dilution. The plates were cooled immediately after pouring and mixing, placed in a 37° C. incubator, and incubated for 24 hours before the colonies were counted.

Although the exposure of the organisms in the sample to the dilution water, before the addition of agar, was accurately timed, the immediate planting period did not represent a zero time exposure to the diluting water, for some time was required to mix thoroughly the portion of the sample with the water and to add the required portions to the plates. As actually observed, this period of exposure was usually 80 seconds, with an occasional variation of 10 seconds.

A possible source of error that could not be fully controlled was the change that might take place in the number of organisms in the sample during the 9 to 10 minute interval which elapsed while the portions of the sample were being added to the various dilution waters under test. While any change in such a short time would not ordinarily be expected, an attempt was made to balance it by varying the order in which the dilution waters were used in each test. No variations in the initial counts obtained were observed, and it was concluded that the number of organisms in the sample did not change during this period.

RESULTS

The results secured in this comparative study of the bacterial counts obtained on samples from seven different sources, using six different dilution waters for each sample, are presented in Tables 2 to 8.

TABLE 2.—*Results with sample from White Clay Creek, Pine Ridge Indian Agency, Pine Ridge, S.Dak.*

Dilution waters used	Bacteria per ml in the diluted sample after indicated intervals			
	Immediate		15 minutes, percent of initial	30 minutes, percent of initial
	Actual count	Percent		
Source water	208	100	96	108
Distilled	196	100	70	67
Bicarbonate	215	100	60	50
Phosphate	220	100	80	86
Formula C	206	100	105	113
Cincinnati tap	214	100	93	102

TABLE 3.—*Results with sample from Lake Michigan near mouth of Chicago River, Chicago, Ill.*

Dilution waters used	Bacteria per ml. in the diluted sample after indicated intervals			
	Immediate		15 minutes, percent of initial	30 minutes, percent of initial
	Actual count	Percent		
Source water	124	100	135	137
Distilled	133	100	86	69
Bicarbonate	117	100	80	51
Phosphate	137	100	86	84
Formula C	133	100	117	107
Cincinnati tap	129	100	103	95

TABLE 4.—*Results with sample from Goose Creek at Charleston, S.C.*

Dilution waters used	Bacteria per ml. in the diluted sample after indicated intervals			
	Immediate		15 minutes, percent of initial	30 minutes, percent of initial
	Actual count	Percent		
Source water	152	100	97	98
Distilled	160	100	74	62
Bicarbonate	147	100	56	48
Phosphate	146	100	97	96
Formula C	149	100	95	97
Cincinnati tap	146	100	97	102

TABLE 5.—*Results with sample from Kansas River at Lawrence, Kans.*

Dilution waters used	Bacteria per ml. in the diluted sample after indicated intervals			
	Immediate		15 minutes, percent of initial	30 minutes, percent of initial
	Actual count	Percent		
Source water	151	100	87	81
Distilled	130	100	95	82
Bicarbonate	128	100	83	70
Phosphate	140	100	93	85
Formula C	143	100	108	84
Cincinnati tap	138	100	97	85

TABLE 6.—*Results with sample from Saugus River watershed at Lynn, Mass.*

Dilution waters used	Bacteria per ml. in the diluted sample after indicated intervals			
	Immediate		15 minutes, percent of initial	30 minutes, percent of initial
	Actual count	Percent		
Source water	380	100	99	105
Distilled	369	100	74	47
Bicarbonate	384	100	87	58
Phosphate	382	100	107	101
Formula C	392	100	101	104
Cincinnati tap	373	100	101	112

TABLE 7.—*Results with sample from Sangamon River, at Springfield, Ill.*

Dilution waters used	Bacteria per ml. in the diluted sample after indicated intervals			
	Immediate		15 minutes, percent of initial	30 minutes, percent of initial
	Actual count	Percent		
Source water	213	100	105	106
Distilled	199	100	82	74
Bicarbonate	190	100	63	50
Phosphate	201	100	114	109
Formula C	211	100	108	106
Cincinnati tap	199	100	105	122

TABLE 8.—*Results with sample from Ohio River at Cincinnati, Ohio*

Dilution waters used	Bacteria per ml. in the diluted sample after indicated intervals			
	Immediate		15 minutes, percent of initial	30 minutes, percent of initial
	Actual count	Percent		
Source water	27	100	93	96
Distilled	27	100	63	41
Bicarbonate	24	100	67	54
Phosphate	30	100	97	87
Formula C	27	100	89	100
Cincinnati tap	27	100	93	96

For convenience in comparing the results, the actual immediate counts have been given in each instance and the subsequent counts obtained at the 15 and 30 minute periods are expressed in percentages of the initial count. This was done in order that possible individual variations in the initial counts obtained with the different diluting waters might not influence the percentages. As a matter of fact, only slight variations were observed in these initial counts, for the average initial counts of the seven samples obtained with each dilution water were as follows: Cincinnati tap water, 175; phosphate water, 179; Formula C water, 180; bicarbonate water, 172; distilled water, 173; and the source waters, 179.

Apparently the relatively short exposure of 80 seconds, of the organisms in the sample to the dilution water before the immediate planting was made, was not sufficient to affect materially the results in any instance. However, when the results for the 15 and 30 minute exposure periods were considered, it is observed that both the bicarbonate and the distilled water gave very low results for both periods with all samples. This general agreement in the results from all samples makes it appear inadvisable to use either distilled or bicarbonate waters for bacteriological dilution at any time. The results obtained from all the samples with the other four dilution waters were about as consistent among themselves as would be expected. The average results for all samples with each dilution water are presented in Table 9.

TABLE 9.—*Average results with samples from all sources with each dilution water*

Dilution waters used	Bacteria per ml. in the diluted sample after indicated intervals			
	Immediate		15 minutes, percent of initial	30 minutes, percent of initial
	Actual count	Percent		
Source water	179	100	102	105
Distilled	173	100	78	62
Bicarbonate	172	100	73	55
Phosphate	179	100	100	96
Formula C	180	100	104	103
Cincinnati tap	175	100	99	106

Beyond a doubt the bactericidal influence of distilled water was due to the complete absence of mineral salts. Direct microscopic observations on living protozoön cells have shown that these cells are usually ruptured when they are placed in distilled water or in waters with a mineral salt concentration which varies widely from that of the medium in which the organisms are found. It is probable that many bacteria are similarly affected when they are placed in distilled water.

In the case of the bicarbonate water the bactericidal effect might be due to the low hydrogen ion concentration induced in part by heat sterilization, or to the toxicity of the bicarbonate water as prepared. To test this point, bicarbonate water (300 p. p. m.) was prepared in three ways: (1) By sterilizing distilled water and, after cooling and shaking, adding the required amount of sodium bicarbonate with aseptic precautions; (2) by filtration of the bicarbonate solution through a Berkefeld W filter; and (3) by the usual procedure of autoclave sterilization. The hydrogen ion concentrations, expressed in pH, for the three solutions thus prepared, were 8.1, 8.3, and 9.1, respectively. Using these three bicarbonate waters with sterilized Cincinnati tap water as a control dilution water, samples of Ohio River water were examined. The results obtained are given in Table 10.

TABLE 10.—*Results with sample from Ohio River at Cincinnati, Ohio, using bicarbonate dilution waters sterilized by various means*

Dilution waters used	Bacteria per ml in the diluted sample after indicated intervals			
	Immediate		15 minutes, percent of initial	30 minutes, percent of initial
	Actual count	Percent		
Bicarbonate A[1]	48	100	67	62
Bicarbonate B [1]	48	100	110	100
Bicarbonate C [1]	49	100	98	90
Cincinnati tap	50	100	102	102

[1] The three bicarbonate waters used were sterilized as follows.
A, by autoclaving in regular manner.
B, by sterilizing distilled water and preparing solution with aseptic precautions.
C, by filtering through a Berkefeld W filter.
Control plates of all three waters were sterile.

These results indicate quite clearly that the bactericidal action of the bicarbonate dilution water was due to the low hydrogen ion concentration and not to the toxicity of the bicarbonate per se.

DISCUSSION

Two prerequisites of synthetic dilution waters for bacteriological use are indicated by the results obtained—the mineral salt content and the hydrogen ion concentration. The results with distilled water

indicate that the presence of some mineral salt is imperative. Of the mineral salts employed in this study, the amount, providing the concentration is within the range found in natural waters, and providing unfavorable hydrogen ion concentrations are not produced, does not appear to affect the results Hydrogen ion concentrations as low as pH 8.2 were used without reducing bacterial numbers during a 30-minute period. However, at pH 9 0 a very marked decrease in bacterial numbers was observed after 15 minutes' exposure. This indicates that when mixed cultures of bacteria are being considered, many of the bacteria are killed or at least become inactive at a pH between 8.2 and 9.0.

At this point in the consideration of dilution water effects, distinction must be made between the death of the bacterial cell (as evidenced by an inability to grow when transferred from a dilution water to a suitable culture medium), and the ability to grow without lag in a medium diluted with such a water. Butterfield (1929) and Parsons et al. (1929) have shown that certain bacteria in dilute mediums grow best, and without lag, at a pH of about 7.0. Undoubtedly with mixed cultures of bacteria, as the hydrogen ion concentration changes from the zone of pH 7.0, where optimum growth is obtained, to the zone of pH 9.0, where bactericidal effects are observed, varying conditions of growth will be encountered. At the lower pH range the majority of the bacteria will grow well and without lag. In the intermediate zone, growth will occur but with increasing periods of lag. Finally, in the higher pH range many of the bacteria will fail to grow at all or may even be destroyed.

The evidence presented by Theriault et al. (1931, pp. 1099–1100) indicates that when distilled or bicarbonate dilution waters are used for biochemical oxygen demand determinations there is a decided lag in the oxidation rate for at least the first day of incubation. This lag was most marked in the higher dilutions, and the effect persisted longer with distilled water. In the same article (pp. 1112–1113) additional data are presented to show the influence of variations in seeding on biochemical oxygen demand results, being particularly marked during the first day of incubation and occasionally persisting to the end of a test. The data presented at this time, which show that in distilled and in autoclaved bicarbonate dilution water 40 to 50 per cent of the bacterial flora, added in polluted water, are rendered inactive in 30 minutes or less, offer a very probable explanation of the low oxygen demand results obtained when distilled water is used. In the case where unsterilized bicarbonate dilution water is used, the hydrogen ion concentration of the mixture, although not low enough to be bactericidal, is in the zone where a definite lag in the bacterial growth of mixed cultures is induced. Many of the bacteria present in sewage, and probably many protozoa also, find conditions in such

mixtures unsuitable for growth; they pass out of the field of action, and a lag of several hours intervenes before the residual organisms, which are able to survive and to grow, multiply in sufficient numbers to produce normal oxidation. Under such conditions not only is a lag produced by the limited activity during the first day of incubation but the biological flora and fauna acting may also be limited to a lesser number of species and the effect produced by this limitation would persist.

SUMMARY

In this study, in which the results obtained in the bacteriological examination of samples from seven widely separated locations in the United States are compared, using five different dilution waters which have been suggested, the following summary appears to be warranted:

1. Phosphate dilution water and Formula C water give the most consistent results.
2. With a view to the development of a dilution water which can be used for both bacteriological and oxygen demand tests, it seems desirable to standardize on the readily prepared phosphate water for further study, as it forms the basis for the more complete Formula C water.
3. In the bacteriological examination of natural waters the dilution water employed must contain some mineral salts. The amount of mineral salts required in the diluting water, within the range found in natural waters, does not appear to be critical so far as the survival of the bacteria is concerned. If growth of the bacteria, without lag, is desired, it is probable that a degree of mineralization corresponding to that of the natural water would be more favorable.
4. The hydrogen ion concentration of the dilution water also does not appear to require critical adjustment, providing it is not lower than pH 8.2, if survival of the bacteria for a short period only is desired. However if growth of the bacteria without lag is desired, a pH of 7.5 should probably not be exceeded.
5. Distilled water and dilution waters with hydrogen ion concentrations in the zone of pH 9.0 or lower are decidedly bactericidal.
6. In making tests on the suitability of dilution waters, the examinations should be made after the water has been sterilized, for the sterilization process may very greatly alter the characteristics of the water. This is particularly true for tap and bicarbonate waters.
7. Consideration must also be given to the glass container in which the dilution water is sterilized. Material dissolved from glass bottles of poor quality during autoclaving may make marked changes in the reaction and in the mineral salt content of the water.

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COURT DECISION RELATING TO PUBLIC HEALTH

Liability of city for sewage pollution of stream.—(United States Supreme Court; *City of Harrisonville* v. *W. S. Dickey Clay Mfg. Co.*, 53 S.Ct. 602; decided May 8, 1933.) Since 1923, the city of Harrisonville, Mo., had discharged the effluent from its sewage-disposal plant into a small stream at a point where it flowed through some pasture land owned by the appellee company. The disposal plant consisted of an Imhoff tank and a drainpipe, and it removed about 60 percent of the putrescible organic matter. The cost of the general sewerage system and disposal plant was about $60,000. A secondary disposal plant, which would have the effect of removing about 30 percent more of the putrescible organic matter, would cost from $25,000 to $30,000. The city's population was 2,000, but only about 1,400 of the inhabitants were served by the general sewerage system. In 1928, the clay manufacturing company, a Delaware corporation, brought suit in a Federal court in Missouri against the city, alleging injury to the pasture land through drainage of the effluent and seeking both damages and an injunction. The district court found that the aggregate loss in rental for 5 years was $500 and that it would cost $3,500 to restore the creek to the condition existing prior to the nuisance. Damages for $4,000 were, therefore, awarded, and in addition it was held that the company was entitled to an injunction, but the city was allowed 6 months within which to abate the nuisance

by introducing some method which would prevent the discharge of putrescible sewage into the creek. On appeal by the city to the circuit court of appeals, that court modified the decree by eliminating therefrom the item of $3,500 damages. The city then carried the case to the United States Supreme Court, not questioning the propriety of the award of $500 damages but contending that the injunction should have been denied. The Supreme Court took the view that complete monetary redress could be afforded the company "by making denial of an injunction conditional upon prompt payment, as compensation, of an amount equal to the depreciation in value of the farm on account of the nuisance complained of." The decree was reversed and the cause remanded to the district court for further proceedings to determine the depreciation in value and to enter a decree withholding an injunction if such sum be paid within the time to be fixed by that court. Portions of the Supreme Court's opinion follow:

First. The discharge of the effluent into the creek is a tort; and the nuisance, being continuous or recurrent, is an injury for which an injunction may be granted. Thus, the question here is not one of equitable jurisdiction. The question is whether, upon the facts found, an injunction is the appropriate remedy. For an injunction is not a remedy which issues as of course. Where substantial redress can be afforded by the payment of money and issuance of an injunction would subject the defendant to grossly disproportionate hardship, equitable relief may be denied although the nuisance is indisputable. This is true even if the conflict is between interests which are primarily private. * * * Where an important public interest would be prejudiced, the reason for denying the injunction may be compelling. * * * Such, we think, is the situation in the case at bar.

If an injunction is granted, the courses open to the city are (*a*) to abandon the present sewage disposal plant, erected at a cost of $60,000, and leave the residents to the primitive methods theretofore employed, if the State authorities should permit; or (*b*) to erect an auxiliary plant at a cost of $25,000 or more, if it should be legally and practically possible to raise that sum. That expenditure would be for a desirable purpose, but the city feels unable to make it. On the other hand, the injury to the company is wholly financial. * * * Denial of the injunction would subject the company to a loss in value of the land amounting, on the basis of the trial court's findings, to approximately $100 per year. That loss can be measured by the reduction in rental or the depreciation in the market value of the farm, assuming the nuisance continues, and can be made good by the payment of money. The compensation payable would obviously be small as compared with the cost of installing an auxiliary plant, for the annual interest on its cost would be many times the annual loss resulting to the company from the nuisance. Complete monetary redress may be given in this suit by making denial of an injunction conditional upon prompt payment, as compensation, of an amount equal to the depreciation in value of the farm on account of the nuisance complained of. We require this payment not on the ground that the nuisance is to be deemed a permanent one, as contended; but because to oblige the company to bring, from time to time, actions at law for its loss in rental would be so onerous as to deny to it adequate relief.

* * * This nuisance has at all times been removable by the device of secondary treatment of the sewage. It may be hereafter abated at any time by the State health authorities requiring such treatment. The city may itself conclude that this should be done in the public interest, financial or otherwise. Being so terminable, pollution of the creek cannot be deemed to be a permanent nuisance as of the date of the installation of the disposal plant in 1923.

DEATHS DURING WEEK ENDED MAY 27, 1933

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended May 27, 1933	Corresponding week, 1932
Data from 85 large cities of the United States:		
Total deaths	7,709	7,822
Deaths per 1,000 population, annual basis	10.8	11.2
Deaths under 1 year of age	573	652
Deaths under 1 year of age per 1,000 estimated live births [1]	48	52
Deaths per 1,000 population, annual basis, first 21 weeks of year	11.8	12.3
Data from industrial insurance companies:		
Policies in force	67,990,952	73,000,630
Number of death claims	12,224	13,176
Death claims per 1,000 policies in force, annual rate	9.4	9.4
Death claims per 1,000 policies, first 21 weeks of year, annual rate	10.7	10.4

[1] 81 cities.

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PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended June 3, 1933, and June 4, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 3, 1933, and June 4, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended June 3, 1933	Week ended June 4, 1932	Week ended June 3, 1933	Week ended June 4, 1932	Week ended June 3, 1933	Week ended June 4, 1932	Week ended June 3, 1933	Week ended June 4, 1932
New England States:								
Maine		1	1	4	5	104	0	0
New Hampshire		1			118	35	0	1
Vermont	1	1			62	358	0	0
Massachusetts	27	38		2	539	1,009	1	2
Rhode Island	1	4			1	32	0	0
Connecticut		3	2	2	289	221	0	0
Middle Atlantic States:								
New York	30	91	[1] 10	[1] 10	2,094	2,150	5	6
New Jersey	20	25	1	7	946	769	2	1
Pennsylvania	52	63			1,257	1,629	0	14
East North Central States:								
Ohio	47	31	94	4	613	2,528	1	5
Indiana	13	15	25	14	211	125	3	5
Illinois [2]	34	51	10	58	702	1,083	20	8
Michigan	28	18	13	6	640	2,691	2	3
Wisconsin	6	5	26	30	330	1,570	1	0
West North Central States:								
Minnesota	8	4	1	3	248	88	3	1
Iowa	4	9			108	3	1	0
Missouri	15	23	2	2	196	61	4	7
North Dakota	3	3			268	20	0	1
South Dakota		4			17	13	1	0
Nebraska	3	8			44	7	1	0
Kansas	3	8		1	261	75	0	1
South Atlantic States:								
Delaware		1	2		14		0	0
Maryland [2 3 4]	6	5	2	3	50	33	1	1
District of Columbia [3]	2	7	1		19	20	1	0
Virginia	6				214		1	1
West Virginia	4	7	1	20	75	155	0	0
North Carolina	7	12	16	48	413	589	1	2
South Carolina [3]	9	5	100	249	252	214	0	0
Georgia [3]	1	4		30		35	0	1
Florida	3	4	7	1	39	6	0	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 3, 1933, and June 4, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended June 3, 1933	Week ended June 4, 1932	Week ended June 3, 1933	Week ended June 4, 1932	Week ended June 3, 1933	Week ended June 4, 1932	Week ended June 3, 1933	Week ended June 4, 1932
East South Central States:								
Kentucky	------	6	16	17	63	32	1	0
Tennessee	4	1	14	21	108	5	1	3
Alabama	6	9	14	32	56	8	1	3
Mississippi	4	4	------	------	------	------	0	0
West South Central States:								
Arkansas	3	------	3	13	210	------	0	0
Louisiana	4	20	18	6	30	5	0	1
Oklahoma [5]	9	9	3	32	130	19	0	0
Texas [2]	30	27	47	33	412	337	2	1
Mountain States:								
Montana [3]	1	1	------	1	28	43	0	0
Idaho	------	------	------	------	43	------	0	0
Wyoming [3]	------	------	------	------	13	55	0	1
Colorado	------	10	23	------	16	126	0	1
New Mexico	9	7	9	7	15	22	0	0
Arizona	2	2	2	6	111	1	0	0
Utah [4]	------	------	3	------	48	2	0	0
Pacific States:								
Washington	4	8	------	------	57	183	0	1
Oregon [3]	1	4	17	27	47	221	1	0
California	38	60	29	41	1,128	264	0	1
Total	448	619	512	739	12,570	16,946	64	72

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended June 3, 1933	Week ended June 4, 1932	Week ended June 3, 1933	Week ended June 4, 1932	Week ended June 3, 1933	Week ended June 4, 1932	Week ended June 3, 1933	Week ended June 4, 1932
New England States:								
Maine	0	0	18	7	0	0	1	2
New Hampshire	0	0	8	17	0	0	0	0
Vermont	0	0	7	15	0	4	0	0
Massachusetts	0	1	253	366	0	0	7	7
Rhode Island	0	0	28	45	0	0	0	0
Connecticut	0	2	54	76	0	0	3	1
Middle Atlantic States:								
New York	2	3	478	984	0	0	4	9
New Jersey	1	0	162	239	0	0	4	2
Pennsylvania	0	1	669	762	0	0	10	6
East North Central States:								
Ohio	0	3	1,039	328	7	23	24	8
Indiana	1	0	64	65	0	19	9	9
Illinois [2]	1	1	375	319	2	7	6	7
Michigan	1	1	349	503	0	9	4	3
Wisconsin	1	0	97	64	0	3	3	0
West North Central States:								
Minnesota	1	0	81	60	1	5	0	1
Iowa	0	0	17	22	14	16	1	1
Missouri	0	0	51	29	4	4	2	0
North Dakota	0	0	3	1	2	1	2	1
South Dakota	0	0	2	3	0	1	2	3
Nebraska	0	0	5	15	1	16	3	0
Kansas	0	0	31	24	2	5	1	0
South Atlantic States:								
Delaware	0	0	7	9	0	0	0	1
Maryland [2 3 4]	0	1	81	60	0	0	2	7
District of Columbia [3]	0	0	10	14	0	0	0	0
Virginia	0	2	39	------	0	------	11	------
West Virginia	0	0	20	17	1	3	4	5
North Carolina	0	2	34	35	0	1	18	9
South Carolina [3]	0	2	1	7	0	0	30	20
Georgia [2]	0	0	2	2	0	0	21	19
Florida	0	0	0	0	0	0	2	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 3, 1933, and June 4, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended June 3, 1933	Week ended June 4, 1932	Week ended June 3, 1933	Week ended June 4, 1932	Week ended June 3, 1933	Week ended June 4, 1932	Week ended June 3, 1933	Week ended June 4, 1932
East South Central States:								
Kentucky	3	0	27	18	1	1	12	15
Tennessee	1	1	23	17	1	30	11	13
Alabama	1	0	3	4	1	9	18	5
Mississippi	0	0	6	6	1	5	4	13
West South Central States:								
Arkansas	0	0	1	4	0	3	7	5
Louisiana	0	0	2	10	2	1	9	10
Oklahoma [5]	0	0	6	12	0	24	2	7
Texas [2]	1	1	38	30	12	48	18	3
Mountain States:								
Montana [3]	0	0	6	7	0	3	3	4
Idaho	0	0	6	1	2	0	0	0
Wyoming [3]	0	0	16	7	1	0	0	0
Colorado	0	9	20	16	0	1	0	2
New Mexico	0	0	5	11	0	2	3	3
Arizona	0	0	11	6	0	1	0	0
Utah [4]	0	0	7	2	0	0	0	0
Pacific States:								
Washington	0	0	40	26	1	10	0	6
Oregon [3]	0	0	25	10	12	15	4	0
California	0	3	132	141	28	9	5	8
Total	14	24	4,368	4,425	96	279	270	215

[1] New York City only.
[2] Typhus fever, week ended June 3, 1933, 23 cases: 2 cases in Illinois, 1 case in Maryland, 2 cases in South Carolina, 5 cases in Georgia, and 13 cases in Texas.
[3] Rocky Mountain Spotted fever, week ended June 3, 1933, 14 cases: 1 case in Maryland, 1 case in District of Columbia, 2 cases in Montana, 6 cases in Wyoming, and 4 cases in Oregon.
[4] Week ended Friday.
[5] Figures for 1933 are exclusive of Oklahoma City and Tulsa, and for 1932 are exclusive of Tulsa only.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week:

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
March 1933										
Colorado	4	28	--------	--------	552	--------	0	173	3	4
April 1933										
Virginia	9	53	358	10	1,044	18	2	243	2	29
May 1933										
Connecticut	1	10	14	--------	1,175	--------	0	517	2	10
District of Columbia	1	12	1	--------	98	2	0	51	--------	1
Nebraska	2	13	--------	--------	747	--------	0	73	5	2
New Mexico	--------	25	11	7	40	3	0	31	1	10
North Dakota	--------	8	22	--------	403	--------	0	33	3	2

Summary of monthly reports from States—Continued

March 1933

Colorado:
- Chicken pox 401
- Mumps 338
- Whooping cough 128

April 1933

Virginia:
- Chicken pox 388
- Diarrhea and dysentery 56
- Lethargic encephalitis 4
- Septic sore throat 23
- Tetanus 1
- Trachoma 1
- Typhus fever 1
- Undulant fever 9
- Whooping cough 158

May 1933

Chicken pox:
- Connecticut 766
- District of Columbia 100
- Nebraska 174
- New Mexico 49
- North Dakota 54

May 1933—Continued

Dysentery:
- Connecticut (bacillary) 5
- New Mexico 3

German measles:
- Connecticut 60

Lethargic encephalitis:
- North Dakota 1

Milk sickness:
- New Mexico 2

Mumps:
- Connecticut 364
- Nebraska 108
- New Mexico 77
- North Dakota 2

Ophthalmia neonatorum:
- Connecticut 1

Paratyphoid fever:
- Connecticut 1

Puerperal septicemia:
- New Mexico 3

Rabies in animals:
- Connecticut 13

May 1933—Continued

Septic sore throat:
- Connecticut 9
- New Mexico 1

Trachoma:
- Connecticut 2
- North Dakota 6

Trichinosis:
- Connecticut 1

Undulant fever:
- Connecticut 1
- Nebraska 2
- New Mexico 1

Vincent's angina:
- New Mexico 1

Vincent's infection:
- North Dakota 13

Whooping cough:
- Connecticut 264
- District of Columbia 34
- Nebraska 112
- New Mexico 103
- North Dakota 6

WEEKLY REPORTS FROM CITIES

City reports for week ended May 27, 1933

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	0		0	2	2	7	0	3	0	9	26
New Hampshire:											
Concord	0		0	0	2	3	0	0	0	0	12
Nashua	0		0	0	0	0	0	0	0	1	
Vermont:											
Barre	0		0	0	0	0	0	0	0	6	1
Burlington	1		0	0	0	0	0	0	0	0	7
Massachusetts:											
Boston	3		1	297	22	83	0	8	1	24	214
Fall River	0		0	0	1	5	0	2	0	4	26
Springfield	0		0	2	1	10	0	1	0	16	32
Worcester	2		0	52	3	21	0	4	0	1	56
Rhode Island:											
Pawtucket	0		0	0	0	2	0	0	0	0	14
Providence	1		0	2	0	16	0	2	0	23	62
Connecticut:											
Bridgeport	0		0	33	1	12	0	4	0	1	32
Hartford											
New Haven	0		0	1	2	3	0	2	0	15	40
New York:											
Buffalo	5		0	85	14	53	0	5	0	33	140
New York	59	9	9	1,317	139	221	0	91	1	142	1,403
Rochester	1		0	2	4	26	0	0	0	11	69
Syracuse	0		0	3	4	14	0	0	0	7	47
New Jersey:											
Camden	1		0	17	3	11	0	0	0	0	35
Newark	0	1	0	154	7	11	0	11	1	43	121
Trenton	0		0	36	0	14	0	3	0	2	21
Pennsylvania:											
Philadelphia	6	2	2	509	20	85	0	23	1	3	429
Pittsburgh	2		0	7	10	80	0	4	0	48	135
Reading	0		0	17	2	7	0	0	0	3	24
Ohio:											
Cincinnati	2	2	2	10	10	30	0	9	0	13	133
Cleveland	8	46	0	4	6	138	0	11	0	80	140
Columbus	0	2	2	4	4	29	0	4	0	1	90
Toledo	1	1	0	211	4	129	0	6	0	6	77
Indiana:											
Fort Wayne	8		0	0	1	8	0	0	3	1	26
Indianapolis	0		1	120	10	15	0	8	0	12	
South Bend	0		0	1	1	1	0	1	0	4	9
Terre Haute	0		0	48	0	6	0	1	0	3	21

City reports for week ended May 27, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Illinois:											
Chicago	2		2	431	42	273	0	18	0	23	600
Cicero	0		0	18	0	4	0	0	0	0	3
Springfield	1		0	0	0	10	0	0	1	0	15
Michigan:											
Detroit	13	1	1	316	10	131	0	22	3	98	258
Flint	0	2	0	17	4	5	0	2	0	7	33
Grand Rapids	1		0	5	0	7	0	0	0	7	43
Wisconsin:											
Kenosha	0		0	4	1	2	0	0	0	21	7
Madison	0			38		2	0		0	0	
Milwaukee	1		0	6	6	51	0	7	0	53	105
Racine	0		0	0	1	5	0	1	0	19	14
Superior	0		0	1	0	0	0	0	0	14	6
Minnesota:											
Duluth	0		0	22	2	2	0	0	0	42	20
Minneapolis	2		1	42	4	41	0	1	1	47	87
St. Paul	0		0	178	0	22	0	2	0	68	62
Iowa:											
Des Moines	3			0		3	0		0	0	29
Sioux City	0			2		1	1		0	0	
Waterloo	0			3		2	1		0	0	
Missouri:											
Kansas City	2		0	39	5	26	0	5	0	1	75
St. Joseph	0		0	33	7	1	0	0	0	1	25
St. Louis	16	1	0	152	7	10	0	7	5	7	16
North Dakota:											
Fargo	0		0	0	0	0	0	0	0	0	9
Grand Forks	0		0	0	0	1	0	0	0	5	
South Dakota:											
Aberdeen	0		0	0	0	0	0	0	0	0	
Nebraska:											
Omaha	3		0	166	8	6	0	3	0	5	51
Kansas:											
Topeka	0		0	90	2	1	0	1	0	4	15
Wichita	1		0	1	0	1	2	1	0	10	24
Delaware:											
Wilmington	1		0	10	4	4	0	1	0	1	35
Maryland:											
Baltimore	3	2	1	13	12	78	0	13	1	33	188
Cumberland	0		0	13	2	0	0	0	0	0	11
Frederick	0		0	0	0	0	0	0	1	1	1
District of Col.:											
Washington	0		0	21	8	10	0	11	0	11	131
Virginia:											
Lynchburg	1		0	52	0	0	0	1	0	5	11
Norfolk	0		0	5	1	3	0	0	0	13	
Richmond	1		0	4	2	4	0	7	0	21	61
Roanoke	0		0	3	0	1	0	4	0	1	18
West Virginia:											
Charleston	0		0	0	0	2	0	1	0	1	9
Huntington	1		0	0	0	3	0	0	0	0	
Wheeling	0		0	5	0	3	0	0	1	1	8
North Carolina:											
Raleigh	0		0	4	0	4	0	1	0	0	13
Wilmington	0		0	29	0	0	0	1	1	1	9
Winston-Salem	0		0	13	0	5	0	2	0	2	7
South Carolina:											
Charleston	0		0	0	0	0	0	3	0	7	31
Columbia	0		0	0	1	0	0	1	0	0	8
Greenville	0		0	6	2	0	0	0	2	0	9
Georgia:											
Atlanta	2	7	1	27	0	0	0	2	6	44	63
Brunswick	0		0	0	0	0	0	0	0	0	1
Savannah	0	8	0	0	2	1	0	2	0	3	34
Florida:											
Miami	1		0	0	2	0	0	1	0	22	15
Tampa	0	2	2	0	1	0	0	1	0	0	34
Kentucky:											
Ashland	0		0	1	0	5	0	0	1	0	
Lexington	0		0	0	0	0	0	1	0	2	10
Louisville	2		0	19	5	16	0	2	0	3	67
Tennessee:											
Memphis	1		0	64	5	2	1	12	6	40	87
Nashville	0		1	7	1	0	0	1	1	1	40

City reports for week ended May 27, 1933—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Alabama:											
Birmingham	1		0	2	3	2	0	3	3	10	55
Mobile	0		1	2	0	0	0	1	0	0	22
Montgomery	0			6		0	0		0	7	
Arkansas:											
Fort Smith	0			0		1	0		0	0	
Little Rock	0		0	124	0	0	0	2	0	0	3
Louisiana:											
New Orleans	6	3	3	6	5	5	0	9	2	4	103
Shreveport	0		0	2	0	1	0	1	0	1	40
Oklahoma:											
Tulsa	0		0	68	0	2	0	0	1	21	
Texas:											
Dallas	3		0		0	8	5	4	0	0	63
Fort Worth	3		0	1	3	2	0	1	0	1	31
Galveston	0		0	0	2	0	0	0	0	0	17
Houston	4		1	0	4	1	0	5	1	0	65
San Antonio	0		2	11	3	0	0	7	0	0	83
Montana:											
Billings	0		0	0	0	0	0	0	0	0	4
Great Falls	0		0	1	1	0	0	0	1	0	4
Helena	0		0	0	0	0	0	0	0	0	1
Missoula	0	1	1	26	0	0	0	0	0	0	8
Idaho:											
Boise	0		0	1	0	0	0	0	0	0	6
Colorado:											
Denver	1	23	0	7	8	12	0	7	1	3	72
Pueblo	0		0	0	0	1	0	0	0	3	8
New Mexico:											
Albuquerque	1		0	12	1	0	0	1	1	0	9
Utah:											
Salt Lake City	0		0	17	1	3	0	0	0	30	22
Nevada:											
Reno	0		0	0	0	0	0	0	0	0	
Washington:											
Seattle	0			1		16	0		0	9	
Spokane	0			0		3	0		0	0	
Tacoma	0		1	2	2	2	0	0	0	0	25
Oregon:											
Portland	0		0	3	4	6	3	2	0	3	57
Salem	0		0	7	0	1	0	0	0	0	
California:											
Los Angeles	20	16	3	376	7	43	8	23	0	56	278
Sacramento	0		0	2	3	1	0	7	0	81	
San Francisco	3	1	1	3	6	5	0	17	1	81	175

State and city	Meningococcus meningitis Cases	Meningococcus meningitis Deaths	Poliomyelitis cases
Maine:			
Portland	1	1	0
New York:			
New York	3	4	2
New Jersey:			
Newark	1	0	0
Ohio:			
Cleveland	1	0	0
Indiana:			
Indianapolis	3	2	0
Illinois:			
Chicago	18	4	0
Michigan:			
Detroit	1	0	0
Wisconsin:			
Milwaukee	1	2	1
Minnesota:			
St. Paul	0	1	0
Missouri:			
St. Louis	1	1	0
Nebraska:			
Omaha	1	0	0
Georgia:			
Atlanta	1	1	0
Washington:			
Seattle	2	0	1
Oregon:			
Portland	0	0	1
California:			
Sacramento	1	0	0

Lethargic encephalitis.—Cases: New York, 2; Philadelphia, 1; Detroit, 1.

Pellagra.—Cases: Baltimore, 1; Washington, 1; Wilmington, 1; Charleston, S.C., 1; Montgomery, 1; New Orleans, 2; Los Angeles, 1; Sacramento, 1; San Francisco, 1.

Typhus fever.—Cases: Charleston, S.C., 1; Savannah, 1; Mobile, 1; Houston, 1.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—2 weeks ended May 20, 1933.—The Department of Pensions and National Health of Canada reports cases of certain communicable diseases for the 2 weeks ended May 20, 1933, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis			2	1	1					4
Chicken pox		13	27	329	420	52	54	11	134	1,040
Diphtheria		2	4	46	6	11	2	2	3	76
Erysipelas				7	12	3		6	2	30
Influenza		3		5	4				16	28
Measles	3	5	15	499	335	6	5		23	891
Mumps		1			395	50	30		64	540
Paratyphoid fever					6					6
Pneumonia		10			19		8		5	42
Poliomyelitis			1	1	1			1		4
Scarlet fever		11	2	103	133	15	13	13	13	303
Smallpox					1		5		1	7
Trachoma									25	25
Tuberculosis	10	7	11	164	48	22	37	5	46	350
Typhoid fever			3	60	14	6	1	1	3	88
Undulant fever					2					2
Whooping cough				112	191	89	22	11	17	442

CUBA

Provinces—Communicable diseases—4 weeks ended April 29, 1933.—During the 4 weeks ended April 29, 1933, cases of certain communicable diseases were reported in the provinces of Cuba as follows:

Disease	Pinar del Rio	Habana	Matanzas	Santa Clara	Camaguey	Oriente	Total
Chicken pox	1	4	1	3	5	8	22
Diphtheria		5	1	8	1	1	16
Malaria	1	4	14	51	46	25	141
Measles		2	19	10	4	5	40
Scarlet fever	1						1
Tetanus, infantile	1				1	1	3
Tuberculosis	3	27	21	29	7	41	128
Typhoid fever	5	7	9	30	8	19	78

DENMARK

Communicable diseases—January–March 1933.—During the months of January, February, and March 1933, cases of certain communicable diseases were reported in Denmark as follows:

Disease	Cases		
	January	February	March
Cerebrospinal meningitis	3	7	4
Chicken pox	63	45	68
Diphtheria and croup	378	214	204
Erysipelas	286	249	281
German measles	11	25	30
Gonorrhea	853	721	760
Influenza	43, 063	51, 273	25, 530
Lethargic encephalitis	5	4	10
Measles	1, 649	1, 427	1, 603
Mumps	408	328	561
Paratyphoid fever	4	10	17
Poliomyelitis	3		3
Puerperal fever	11	13	16
Scabies	985	718	803
Scarlet fever	264	161	240
Syphilis	61	58	56
Tetanus	4		1
Typhoid fever	1	3	1
Undulant fever (Bact. abort. Bang)	42	39	32
Whooping cough	1, 619	1, 422	1, 236

FRANCE

Vital statistics—Years 1931 and 1932.—During the years 1931 and 1932, births, deaths, marriages, and divorces, were reported in France as follows:

	1931	1932
Number of marriages	326, 538	314, 878
Number of divorces	21, 212	21, 848
Number of live births	730, 249	722, 246
Stillbirths	28, 058	27, 537
Number of deaths	680, 710	660, 882
Deaths under 1 year of age	55, 444	55, 177

NOTE.—The population of France was estimated as 41,835,000 during 1931.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

(NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for May 26, 1933, pp. 586–596. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued June 30, 1933, and thereafter, at least for the time being, in the issue published on the last Friday of each month.)

Cholera

Philippine Islands.—During the week ended June 3, 1933, cholera was reported in the Philippine Islands as follows: Province of Bohol, 40 cases, 20 deaths; Province of Cebu, 1 case.

During the 3 weeks ended May 20, 1933, 29 cases of cholera with 23 deaths were reported in the Island of Samar, Philippine Islands.

Smallpox

Bolivia.—During the month of April 1933, 18 cases of smallpox were reported at La Paz, Bolivia; 3 cases at Potosí; several cases in the Department of Potosí; and isolated cases in the Department of Chuquisaca, Bolivia.

Mexico.—During the latter part of May 1933, smallpox was reported in the vicinity of Camaron, Mexico. Camaron is on the Don Martin Dam (or lake), about 70 miles by highway southwest of Nuevo Laredo, Mexico.

Typhus Fever

Bolivia.—During April 1933, 167 cases of typhus fever were reported in La Paz, Bolivia; several cases in the Department of La Paz; isolated cases in Cochabamba; 14 cases in Oruro; and 9 cases in Potosí, Bolivia.

Mexico.—During the latter part of May 1933, cases of typhus fever were reported in the vicinity of Camaron, Mexico.

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UNITED STATES PUBLIC HEALTH SERVICE

HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst Surg Gen R C WILLIAMS, *Chief of Division*

The PUBLIC HEALTH REPORTS are issued weekly by the United States Public Health Service through its Division of Sanitary Reports and Statistics, pursuant to acts of Congress approved February 15, 1893, and August 14, 1912.

They contain: (1) Current information of the prevalence and geographic distribution of preventable diseases in the United States insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other communicable diseases throughout the world. (2) Articles relating to the cause, prevention, or control of disease. (3) Other pertinent information regarding sanitation and the conservation of public health.

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PUBLIC HEALTH REPORTS

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DISTRIBUTION OF MOTTLED ENAMEL IN THE UNITED STATES

By H. TRENDLEY DEAN, *Dental Surgeon, National Institute of Health, United States Public Health Service*

INTRODUCTION

This paper reports the results of a survey to determine the distribution of mottled enamel in the United States, a preliminary report (1) of this study having previously been made. No reference will be made to a description of the lesion, its histology, or work of recent investigators respecting its etiology. For these phases of the problem the reader is referred to the work of Black (2) and McKay (3), Williams (4), Churchill (5), Smith, Lantz, and Smith (6), Smith and Lantz (7), and Sebrell, Dean, Elvove, and Breaux (8). In 1930 McKay (9), in an article on geographical distribution, listed a number of areas where mottled enamel had been definitely demonstrated. In addition to those listed by McKay, Ackeroyd (10) and Kehr (11) report certain endemic areas in New Mexico and Kansas, respectively. A recent publication by Smith and Smith (12) reports about 45 towns or rural districts where mottled enamel is endemic in Arizona. For the furtherance of future study on this problem, McKay (9) also compiled a complete bibliography on the literature of mottled enamel.

METHOD OF SURVEY

This survey was made in the following manner: Letters were addressed to the secretaries of each of the State dental societies, stating the purpose of the investigation and requesting the names and addresses of the secretaries of the various component, district, or local societies within the State. A questionnaire was then sent to the secretary of each of the component or district societies. The only exception was that no questionnaire was sent to those societies with almost exclusive urban membership, such as New York City, Chicago, or Philadelphia. Of the 415 questionnaires sent to the various component or local societies asking for a report on mottled enamel within the geographical boundaries of their society, 207 replied.

QUESTIONNAIRE SENT TO SECRETARIES OF DENTAL SOCIETIES

Dear Doctor.

There exists in about 55 areas in the United States the enamel dystrophy known as "mottled enamel." The permanent teeth erupt presenting a dead white or opaque appearance, sometimes being pitted. In a high percentage of cases these teeth later take on the characteristic "brown stain." This developmental dystrophy is peculiar to the native-born children of an endemic area, or those taken in the area very early in childhood.

We are desirous of knowing whether this condition exists within the geographical boundaries of your dental society, and would appreciate any data which you might furnish us. If your society is meeting in the near future, would you discuss this matter with the members? If NO cases exist, will you return this questionnaire so that we may likewise have that information?

1. Does mottled enamel occur locally?-------------------------------
2. If present, approximate number of cases?-------------------------
3. If present, what percentage of native-born children and other susceptibles would you roughly estimate, have it?-------------------------
4. Are cases from any particular area?------------------------------
   If so, what city, town, or county?-------------------------------
5. If any particular area is affected, what type of drinking water is used? (River, artesian, shallow wells, spring, etc.)-------------------

A self-addressed envelope which does not require postage is enclosed for your answer. Any other information which you might be in position to furnish us concerning this problem would be gratefully appreciated.

Respectfully,

H. T. Dean,
Dental Surgeon, U.S. Public Health Service.

INDIVIDUAL QUESTIONNAIRE SENT TO DENTISTS, HEALTH OFFICERS, AND PHYSICIANS

Dear Doctor:

There exists in about 75 areas in the United States the enamel dystrophy known as "mottled enamel." The permanent teeth erupt, presenting a dead white or opaque appearance, sometimes being pitted. In a high percentage of cases, and in certain areas, these teeth later take on the characteristic "brown stain." This developmental dystrophy is peculiar to the native-born children of an endemic area, or those taken in the area very early in childhood.

We desire to know whether this condition exists within the geographical boundaries of your county and would appreciate any data which you might furnish. If no cases exist, will you kindly return this questionnaire stating that the county is negative for mottled enamel?

1. Does mottled enamel occur in your county?---------------------------
2. If present, approximate number of cases?------------------------------
3. If present, what percentage of native-born children and other susceptibles, would you roughly estimate, have it?-----------------------------
4. Are cases from any particular area?----------------------------------
   If so, what city, town, or part of the county?------------------------
5. If any particular area is affected, what type of drinking water is used? (River, artesian, shallow wells, spring, etc.)---------------------------

   (In the light of recent research on this problem, the drinking water used from birth to about 12 years of age, or during the period of calcification of the permanent teeth, is apparently an important etiological factor).

Any other information which you might be able to furnish us, either with respect to your own county or some endemic area that you know of, would be gratefully appreciated. A self-addressed envelope which does not require postage is enclosed for your answer.

Respectfully,

H. T. DEAN,
Dental Surgeon, U.S. Public Health Service.

In certain States where organization of district societies does not completely cover the State, or in States where for geological reasons we desired a more complete report than is ordinarily included in a society report, a questionnaire [1] was sent to one or more individual dentists in each county. These States included Mississippi, New Mexico, Nevada, Utah, and Wyoming. Areas partially covered by these county questionnaires were certain parts of north central Illinois, where the water obtained from deep wells and used for domestic purposes showed a high sodium bicarbonate content, the Panhandle and west Texas, and rock phosphate areas in Kentucky, Idaho, South Carolina, and Tennessee. This same type of county questionnaire was also sent into certain limited areas in Alabama, Florida, Indiana, North Carolina, North Dakota, Oklahoma, Oregon, South Carolina, South Dakota, and Virginia. In cases where Polk's Dental Register (1928) failed to show a dentist practicing in a county, the questionnaire was sent to the county health officer, and in a few cases to local physicians. In all, 1,197 of these individual questionnaires were sent, and from these, 632 replies were received, while 47 more were returned marked "unclaimed", "deceased," etc. (table 1). The distribution of individual questionnaires is shown in figure 1.

Opportunity is taken here to thank the many general practitioners who cooperated so freely in this survey. Many, in addition to answering the questionnaire as completely as possible, included long reports of local conditions, analyses of water supplies, and summaries of school surveys, revealing the presence or absence of mottled enamel. But for the whole-hearted interest of these individual dentists, physicians, county health officers, and dental society officers who gave so freely of their time and effort, much of this report could not have been written.

[1] The apparent discrepancy between the number of areas stated in the two questionnaires is due to the fact that the later questionnaire included areas made known subsequent to the date of the first questionnaire.

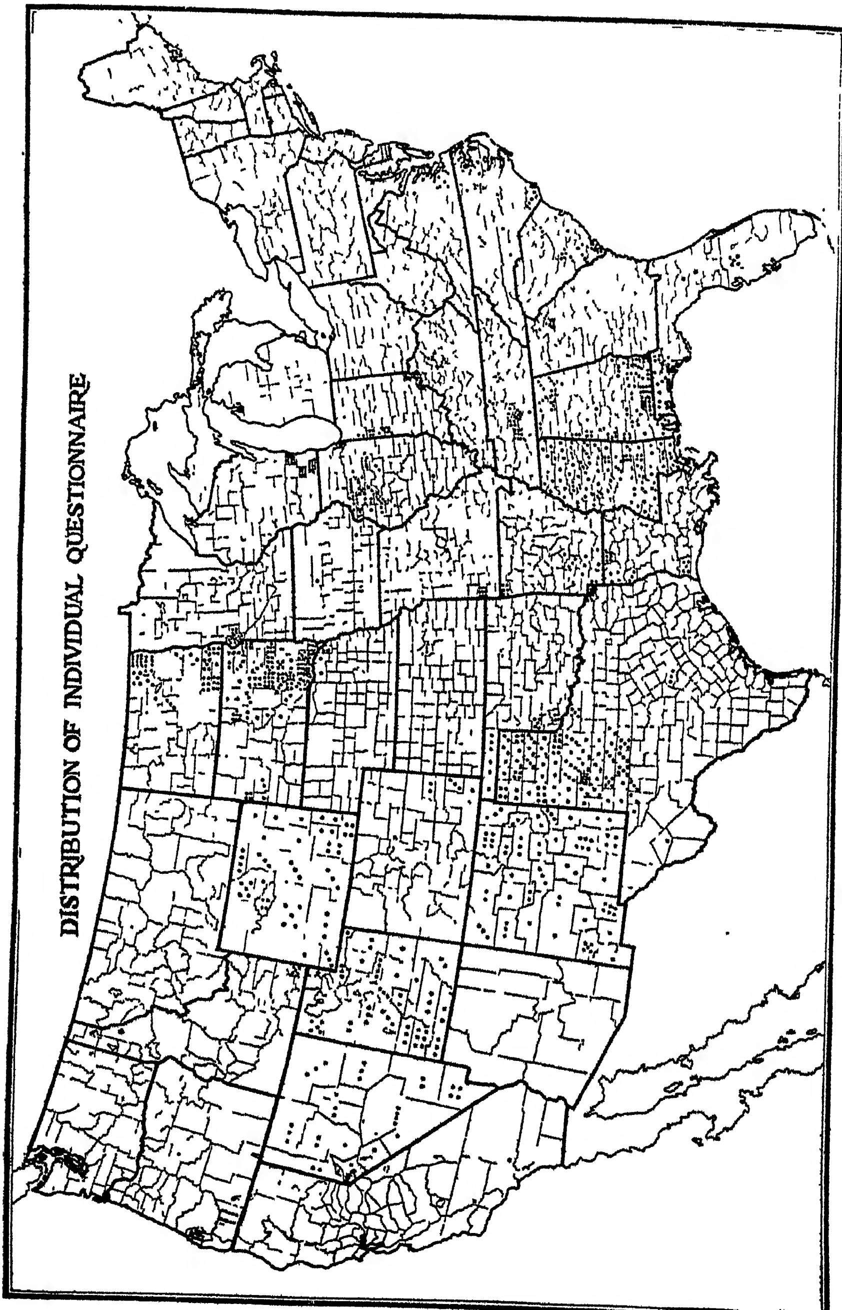

FIGURE 1.—Map showing distribution of individual questionnaire.

TABLE 1.—*Distribution of questionnaires*

State	To component dental societies			To individuals		
	Number sent	Number of replies	Number returned "unclaimed," "wrong address," etc	Number sent	Number of replies	Number returned "unclaimed," "deceased," etc
Alabama	3	1	0	109	45	2
Arizona	2	1	0	0	...	...
Arkansas	5	4	0	18	11	0
California (northern)	15	8	1	0	...	...
California (southern)	11	8	0	2	2	...
Colorado	10	5	0	6	2	2
Connecticut	6	5	0	0	...	...
Delaware	1	1	...	14	8	0
Florida	5	4	0	26	12	1
Georgia	12	8	0	11	7	2
Idaho	3	2	1	6	2	0
Illinois	24	12	0	68	38	4
Indiana	14	9	0	31	16	0
Iowa	10	4	0	2	1	0
Kansas	9	3	0	0	...	...
Kentucky	9	4	0	9	7	0
Louisiana	7	3	0	18	6	0
Maine	6	2	0	0	...	...
Maryland	5	2	0	0	...	...
Massachusetts	4	0	0	0	...	...
Michigan	11	2	0	0	...	...
Minnesota	7	3	0	16	11	0
Mississippi	4	2	0	109	54	1
Missouri	11	5	0	10	5	0
Montana	10	6	0	0	...	...
Nebraska	8	5	0	4	0	0
Nevada	0	...	...	35	15	2
New Hampshire	3	1	0	0	...	...
New Jersey	12	4	1	0	...	...
New Mexico	0	...	...	74	49	3
New York	7	3	0	0	...	...
North Carolina	5	2	0	38	16	1
North Dakota	6	4	0	56	27	3
Ohio	21	13	0	0	...	...
Oklahoma	6	4	0	15	12	0
Oregon	9	5	0	23	10	3
Pennsylvania	19	12	1	0	...	...
Rhode Island	0	...	...	0	...	...
South Carolina	4	2	0	20	8	1
South Dakota	5	1	0	142	78	4
Tennessee	10	1	0	32	15	1
Texas	19	11	0	146	93	8
Utah	4	3	0	52	26	3
Vermont	3	2	0	0	...	...
Virginia	10	6	0	17	10	0
Washington	13	6	0	0	...	...
West Virginia	12	6	0	0	...	...
Wisconsin	27	11	0	36	21	...
Wyoming	2	1	0	52	25	6
Total	415	207	4	1,197	632	47

Evaluating a survey of this type is fraught with difficulties. First, all reports which were in the least doubtful were eliminated. Often the answer indicated that the individual was unfamiliar with mottled enamel and was confusing it with the hypoplasias concomitant with the erythematous or febrific diseases of childhood. These were of course eliminated from further consideration. Second, those reporting a very low incidence were likewise set aside as unimportant. On the other hand, when several men in different parts of a county call attention to a particular area where mottled enamel is probably

endemic, or when local dentists or societies submit extensive reports of local conditions, the evidence becomes of value pending confirmation. It has been impossible to confirm all of these reported areas by personal surveys, but they are included in this paper as "reported areas" so that others interested in mottled enamel may confirm or disprove them by surveys (fig. 2).

Detailed surveys made by the writer included Courtland, Va.; Minonk and Fairbury, Ill.; Windsor, N.C ; Conway, S C.; rural districts in Berkeley and Charleston Counties, S.C.; and two rural areas in Hickman and Maury Counties, Tenn. In detailed surveys the clinical findings are first recorded, and then the individual water history is noted on a card (fig. 3) provided for that purpose. Of the areas just referred to, Courtland (3) (13) and Minonk (14) have been previously reported in the literature In addition to the foregoing, endemic mottled enamel has been observed by the author at Harrold, Miller, St. Lawrence, and Vayland, S.Dak. Time did not permit, however, the taking of a detailed history of each affected individual in order to determine the local incidence. A moderately severe type of mottled enamel with brown stain quite common was observed at Harrold and St. Lawrence.

SPECIAL POINTS OF INTEREST BY STATES

Some of the earliest reports in the literature, Rodriguez (15) and McKay (3), refer to mottled enamel areas in this State. A recent publication by Smith and Smith (12) covers in detail the distribution of mottled enamel in Arizona and lists the affected communities. In this report they state: "The survey disclosed about 45 towns or rural districts in Arizona in which mottled enamel is endemic", in degrees varying from "very mild" to "severe." Most of these communities lie along two rivers, namely, the Gila and the San Pedro, the latter flowing into the Gila.

In addition to these areas, Dr. Leslie W. Foster, field dentist of the Indian Service, writing from Keams Canyon, calls attention to the presence of mottled enamel among the Indian children at the Polacca Day School located at Polacca, in Navajo County. Dr. Fred B. Bass, also a field dentist of the Indian Service, writes from San Carlos that the "condition is very prevalent among all the Indians of southern Arizona, San Carlos Apaches, Pimas, Papagos, and Mohaves. The Apaches live in Gila and Graham Counties, the Pimas in Pinal and Maricopa Counties, the Papagos in Pima County, and the Mohaves in Yuma County." Dr. Bass states that, with the exception of the Papagos, the drinking water is obtained, in the main, from shallow wells, 20 to 40 feet deep. He also adds that

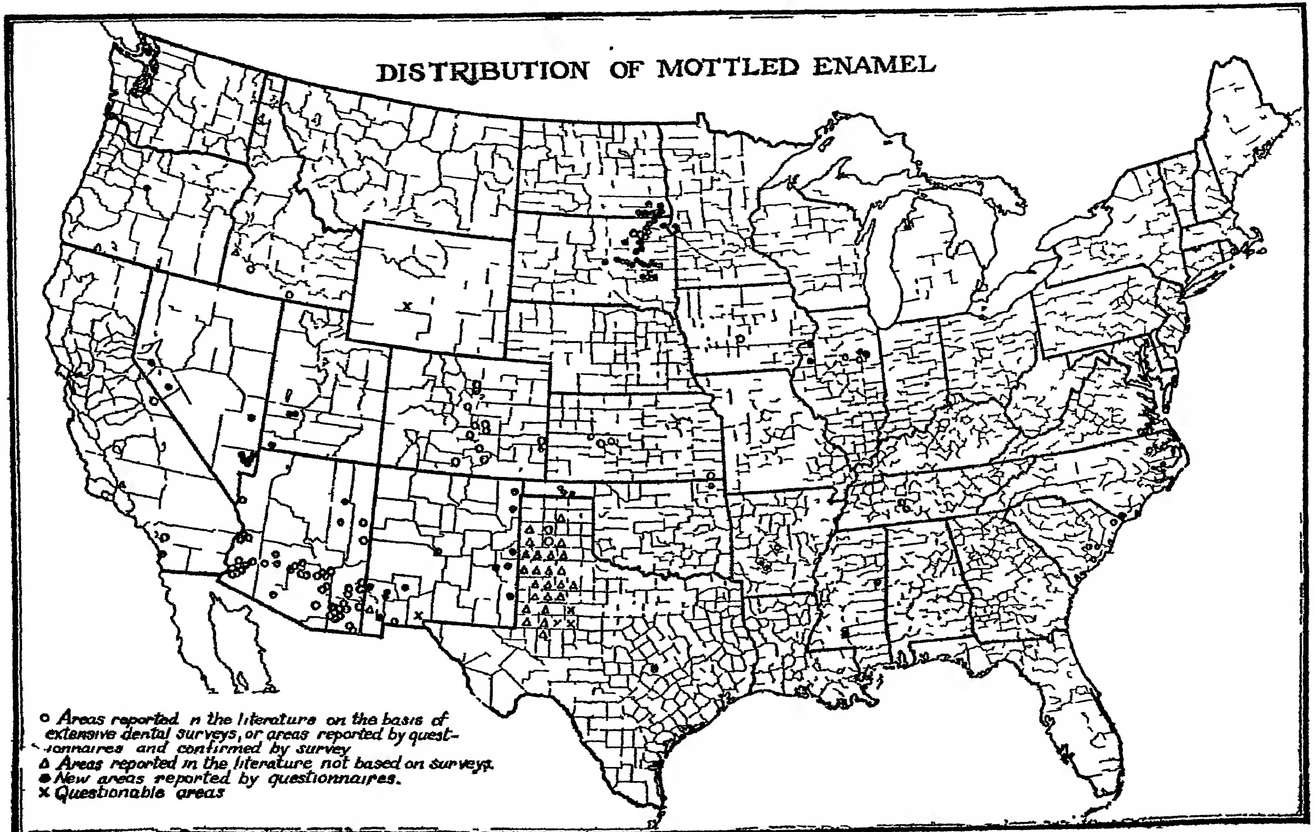

FIGURE 2.—Map showing distribution of mottled enamel in the United States.

mottled enamel is prevalent among white people living on the Gila and San Pedro watersheds.

ARKANSAS

In 1930 Kempf and McKay (16) reported the results of a study made at Bauxite, where mottled enamel was endemic. In addition

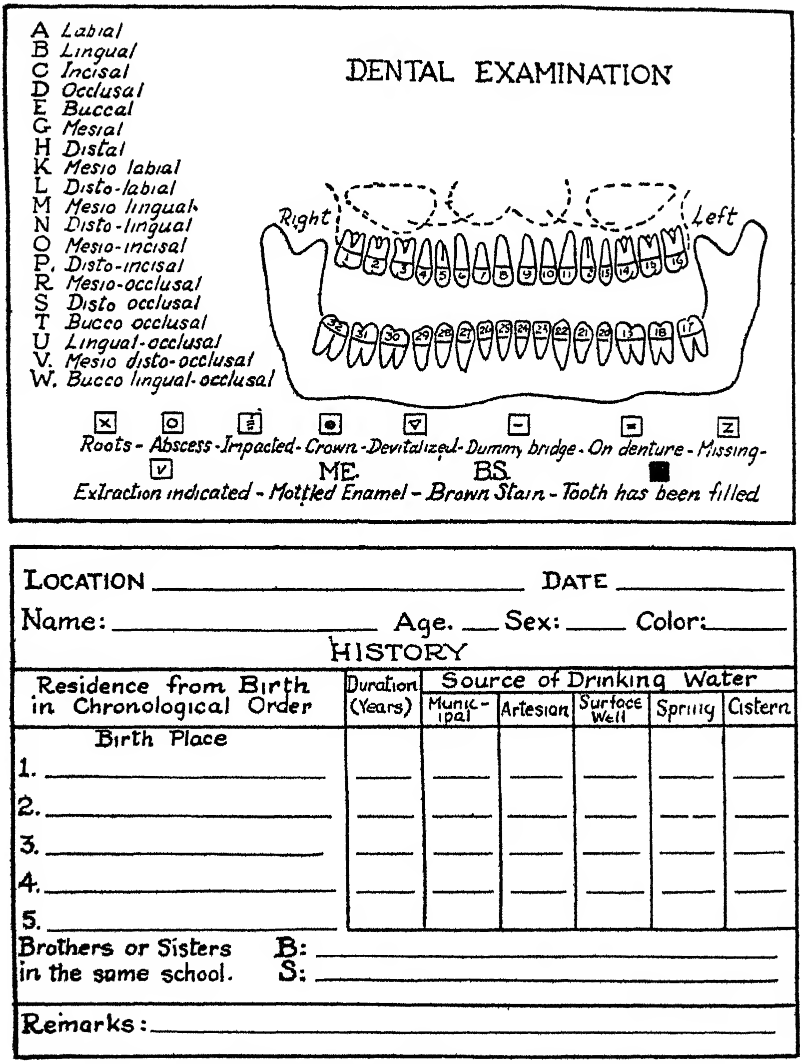

FIGURE 3.—Record of dental examination and individual drinking water history

to this well-known area at Bauxite, Saline County, Gurdon and Okolona in Clark County have been reported to us in questionnaires as endemic areas. Three different dentists call attention to the Gurdon area, two of the reports containing much supplemental data.

CALIFORNIA

McKay (9) reports mottled enamel at Benton Hot Springs, in the upper Owens River Valley, Montecito, and Las Vegas, suburbs of Santa Barbara; Elsinor Hot Springs, Warner's Ranch, north of San Diego; and Maricopa. With the exception of Maricopa, the use of water from a hot spring is reported as the associated factor The number of people affected is apparently negligible. With respect to Maricopa, McKay states: "No definite information available either as to extent of the affliction or water conditions" Dr. Clayton W. Akers, formerly of Maricopa, but now practicing at Taft, states that the majority of the children who were born in Maricopa or who moved there at an early age have mottled enamel, some cases being very severe He adds that the population in the affected area uses a spring for its drinking water.

COLORADO

Colorado Springs is the first area in the United States where mottled enamel was reported as endemic. In 1910 Fynn (17), referring to the enamel defects of the children of Colorado Springs, stated that "87½ percent of the children born and raised in this city have defects of the enamel." He referred to the condition which we now term mottled enamel as "enamel defects of local origin." This mottled enamel area at Colorado Springs had been the subject of study even before this. There is a reference in the literature by McKay (3) that a "systematic endeavor to investigate this lesion was undertaken by the Colorado Springs Dental Society soon after its organization in 1902." McKay adds that the work of investigation began in an organized way in 1908. Black became interested in the problem about this time and visited the area for field study in 1909. This investigation of Colorado Springs and the Pikes Peak watershed by Black (2) and McKay (3) culminated in a thorough and extensive report on the histopathology and epidemiology of mottled enamel. Williams (4) has somewhat modified Black's original conception of the histology of mottled enamel, but subsequent surveys have tended to add further evidence to McKay's original hypothesis that some rare element in the drinking water was the etiological factor. Later McKay (18) reported mottled enamel endemic at Towner, a small community in Kiowa County near the Kansas State line.

No new areas were reported in the questionnaires sent the several component societies in the State. Dr. Oren V. Shaw writes that in the examinations made at the Colorado Springs Public School Dental Clinic during the years 1930–31, there were 160 children examined who were born in Colorado Springs. Of this group, 97, or slightly over 60 percent, showed mottled enamel.

Six questionnaires were sent to dentists in Cheyenne, Prowers, and Baca Counties, in the southeastern portion of the State Dr. Alfred W. Leonard, of Holly, calls attention to a mottled enamel area at Hartman, in Prowers County, where he states that approximately 75 percent of the children are affected He further adds that the drinking water is obtained from wells, 100 to 300 feet in depth.

McKay has reported two endemic areas in Idaho, one (19) at Oakley in Cassia County, and one (18) at Bruneau in Owyhee County. A questionnaire from Dr. Vaughan D. Lyons, secretary of the Upper Snake River Dental Society, indicates that mottled enamel is probably endemic at Wilson, in the northwest section of Owyhee County, and apparently associated with the use of artesian water. Previous reference has been made to this area at Wilson by Smith and Smith (12).

Minonk, located in the northeastern portion of Woodford County, was reported as an endemic area in 1928 by Bunting (14). McKay (18) also refers to this area and notes a deep-well association. During February 1932 the writer examined 39 children at the Minonk school, of which number 21, or 53 percent, showed mottled enamel. There were 9 children who had used the Minonk municipal water exclusively from birth, 5 of whom showed mottled enamel. The city water at Minonk is obtained from two deep wells. The "old" well is 1,850 feet deep, while the "new" well is reported to reach a depth of 2,005 feet.

Fairbury, a community with a population of 2,310, and located in the southern part of Livingston County, was reported as an endemic area by the McLean County Dental Society. The author visited this area shortly before the examination at Minonk and examined 68 children at the North School. These children were principally from the sixth and seventh grades. Of this group, 21 had used Fairbury city water exclusively from birth; 14 of these, or 66 percent, showed mottled enamel. Fairbury obtains its municipal water supply from three wells, 2,100, 2,000, and 1,600 feet in depth, respectively.

Dr. L. W. Neber, former superintendent of mouth hygiene of the Illinois State Department of Health, who assisted in the examination at Minonk, and the Rock Island Dental Society report mottled enamel at Milan, a small community with a population of 888 located in Rock Island County. Dr. Neber stated that he found a number of children showing the white opaque type of mottled enamel with little or no brown stain. The drinking water is obtained from a 1,100-

foot drilled well. The Warren Dental Society reports a low incidence of mottled enamel at Monmouth and adds that the municipal water supply is obtained from two wells 2,445 feet deep and cased 1,200 feet. Later communications from Dr. E. B. Knight, the secretary of the society, indicate that mottled enamel is probably more prevalent than when first reported.

Dr. P. A. Pyper, of Pontiac, reports mottled enamel cases in the surrounding rural districts where deep-well water is used. Both he and Dr. L. B. Muzzy, of Odell, call attention to mottled enamel in Odell. Dr. Pyper also directs attention to several farms around Emington, about 25 miles northeast of Pontiac, where the inhabitants use deep wells and the children born and reared there show badly marked teeth. Dr. W. G. Ross, of Kempton, Ford County, writes that there are many cases in Kempton. It is interesting to note that Kempton is not far from the area referred to by Dr. Pyper around Emington, in Livingston County.

IOWA

Mottled enamel is reported as endemic at Ankeny, in Polk County, by Ostrem, Nelson, Greenwood, and Wilhelm (20). The water supply, according to these investigators, is obtained from deep wells.

KANSAS

Mottled enamel in Kansas has been extensively studied by Kehr (11). This investigator reported areas of mottled enamel at Chetopa, La Crosse, Utica, and Bazine, which were confirmed by survey.

MINNESOTA

McKay (19) reports an area at Graceville, Big Stone County, and definitely associates it with the use of deep well water. Dr. W. H. Strong, of Graceville, states that the wells from which the municipal water supply is obtained are from 500 to 600 feet deep. Dr. Strong also estimates that about 90 percent of the native-born children are affected.

Sixteen questionnaires were sent to dentists in Traverse, Stevens, and Big Stone Counties, of whom 11 replied. Dr. Alf T. Watzke, of Brown Valley, Traverse County, writes that, formerly, when the people of Brown Valley obtained their drinking water from artesian wells, mottled enamel was endemic among the children. The community installed a city water supply which is obtained from a spring, and children calcifying their permanent teeth under the new water supply are free from the dystrophy. Dr. Harold N. Weickert, of Wheaton, Traverse County, notes in his report that mottled enamel is endemic in a small section of the southern part of this county where the children use a "soft" water obtained from deep wells.

MISSISSIPPI

Seven areas endemic for mottled enamel are located in that part of Virginia, North Carolina, and South Carolina lying in the Atlantic coastal plain. Mississippi is one of the few States lying wholly in the Atlantic coastal plain. There are no reports in the literature of mottled enamel areas located in this State. The component or district dental societies are limited to four, located principally around the larger centers of population.

A survey by counties was decided upon and one or more questionnaires were sent to practicing dentists of each county. There are 84 counties in this State. Polk's Dental Register (1928) listed no practicing dentist in 5 counties, viz, Benton, Forrest, Issaquene, Sharky, and Warren. Questionnaires were sent to one or more individuals in each of the remaining 79 counties. These questionnaires totaled 109, and 54 replies from 46 different counties have been received.

Dr. D. N. Garner, President of the Mississippi Dental Association, writing from West Point, Mississippi, states: "West Point is located about on the dividing line between the sandy, or hilly section, and the black-lime, or prairie belt of the State. Going west from this town into the hills, where the people use water from shallow, or pump, wells, we find no mottled enamel of any consequence. Going east and south into the black land, the condition is very prevalent, some cases having but little enamel on their permanent teeth. In this section people use water from artesian wells. There are two strata of this water. The first seems to be free from minerals, and will overflow only in low lands. The second seems to have quantities of some mineral, largely iron, and overflows on higher land. This last-mentioned section is where we find so much mottled enamel."

Those counties in which the reports indicate mottled enamel are as follows:

Noxubee County: Doctor Garner writes that he examined about 200 school children at Brookville and found about 40 cases of mottled enamel. Dr. D. W. Reilly, of Okolona, also notes in his report that mottled enamel occurs at Brookville and states that the water supply is obtained from a deep well. Dr. M. M. Brown, of Macon, estimates that there are about 200 cases in the county principally from the eastern and southern sections. He also notes an artesian well association.

Lawrence County: Dr. B. A. Batson, of Monticello, states that a large percentage of the population is affected with mottled enamel. It is interesting to note that Dr. Noel R. Thompson, of Brookhaven, also calls attention to a mottled enamel area in Lawrence County, located at Nola.

NEVADA

This State is very sparsely populated and there are no district dental societies. It became necessary, therefore, to send one or more questionnaires to dentists in each county. In counties where there were no dentists, information was requested from the county health officer or local physician. Points of interest disclosed in the replies were as follows:

Clark County: This is probably the most extensive area in Nevada. Dr. J. Dayton Smith of Las Vegas writes: "In the Moapa and Virgin valleys, about 80 miles from Las Vegas, the native children have mottled enamel almost 100 percent." Doctor Smith states that the communities affected are Moapa, St. Thomas, Bunkerville, and Overton. He adds that the water supply is obtained from river and shallow wells. Dr. Charles H. Masterson, formerly of Tonapah, now of Las Vegas, also calls attention to the high incidence of mottled enamel in this area and states that most of the cases he has seen were associated with the use of water from shallow wells. Dr. E. H. Conger, of St. George, Utah, makes some interesting comments respecting this area. He has an office in Overton, and one at Mesquite, which he visits bimonthly. He writes that the people of Overton get their drinking water from a small stream known as the Muddy Valley River, the source of which is a large nearby spring. In Mesquite, the people obtain water from the Rio Virgin, into which a number of hot sulphur springs empty a few miles from the community. Doctor Conger states that a large percentage of children in both communities are affected. Dr. Wilford C. Cox, also of St. George, Utah, likewise reports a high incidence of mottled enamel in the Moapa Valley of Nevada.

Lincoln County: From Caliente, Dr. Willard W. Stockham, a physician, writes that about 25 percent of the children at Panaca are affected. He states that they obtain their drinking water from a spring, the water of which is carried in open ditches.

Lyon County: Both Dr. E. B. Dawson, of Yerington, and Dr. C. H. Masterson, formerly of Yerington, but now practicing at Las Vegas, report mottled enamel in this country. The latter noted that a large number of cases came from the "Wabuska district" where the drinking water is apparently obtained from shallow wells.

Mineral County: Dr. Wm. J. Lanahan, field dentist of the Indian Service, while making examinations at Schurz, Nevada, observed typical cases of mottled enamel among Indians who had resided at Sodaville from birth until adult life.

NEW MEXICO

The only area of mottled enamel endemicity definitely described in the literature is that at Columbus in Luna County, which was

reported by Ackeroyd (10) in 1923. McKay (9), in an article on geographical distribution, states, in referring to New Mexico, that it is found in "various small communities over the State, principally adjacent to the eastern boundary (Texas). No reliable data as to water supply and no definite knowledge of the particular towns afflicted"

There are no component or district dental societies in the State. Seventy-four questionnaires were sent to individual dentists and replies have been received from 49. Of the 31 counties in the State, one or more replies have been received from 29 counties.

Areas reported are as follows:

Chaves County: Dr. J. E. Rose of Roswell, reports a small area in the extreme northeastern section of the county near Kenna.

Dona Ana County: From the reports of Dr. S. T. Barnhill and Dr. O. H. Brown of Las Cruces, it would appear that mottled enamel is being produced in certain sections of the county where the drinking water is being obtained from shallow wells. The data with respect to this county is indefinite; but Las Cruces, the county seat, where the drinking water is obtained from wells approximately 200 feet deep, is apparently nonendemic for mottled enamel. This county is listed as questionable.

Grant County: Mottled enamel is seemingly widespread throughout this county. Dr. L. A. Jessen, of Santa Rita, states that a high percentage of individuals using certain water supplies along the Membres River are affected. He specifically refers to the Sherman School on the Membres River where a very high percentage of children are affected. Dr. Frank E. Morton, of Hurley, writes that approximately 95 percent of the native-born children are affected. From another section of the county, Dr. W. H. Chapin, of Silver City, reports mottled enamel in the Gila River district in the western portion of the county. Again, from another section of this county, the extreme southern tip, comes a report from Acting Assistant Surgeon E. J. Thornberry, of the Public Health Service, that practically all the children of Hachita develop mottled enamel. Several of these observers supplemented their reports with extensive descriptions of local conditions.

Hidalgo County: Dr. R. E. Buvens, of Lordsburg, states that about 50 percent of the children are affected and adds that this is also true of some of the nearby communities. This area has also been referred to by Smith and Smith (12).

Lea County: Dr. H. J. Coburn, of Tatum, states that mottled enamel is general throughout the county and estimates that 90 percent are affected. He states that drinking water is obtained from shallow wells.

Luna County: From Deming, Dr. M. J. Moran, writes that mottled enamel occurs in all the district south of the Florida and Tresher-manas Mountains but not in the immediate vicinity of Deming. He estimates that at least 90 percent of all children in this endemic district are affected. He also adds that mottled enamel is still endemic at Columbus.

Roosevelt County: Dr. Raymond W. Means, of Portales, states that a severe type of mottled enamel is widely distributed in this county.

Sierra County: Dr. A. C. White, the county health officer, writes that 40 to 50 percent of the children of this county are affected. There is no dentist listed as practicing in the county.

Torrance County. Dr. E. S. Hamel, who formerly practiced at Mountainair, estimated that about 25 percent of the children are affected and noted that water from deep wells was used for drinking purposes.

Union County: From Clayton, Dr. C. E. Keller, writes that about 50 percent of the children are affected in the town of Amistad, where water for domestic purposes is obtained from shallow wells. Dr. C. M. Hurley, also of Clayton, reports that he finds mottled enamel in those individuals coming from the southern part of the county around Bueyeros and in the northern part around Cuates. Capulin in the extreme northwestern part of the county is considered questionable.

No reports were recieved from De Baca or Mora Counties; all others were reported as negative.

NORTH CAROLINA

This survey disclosed two areas in North Carolina where mottled enamel is endemic. One reported by Dr. W. R. Davis, of Whiteville, is a narrow strip, 5 to 10 miles wide, a thinly populated area in Columbus and Brunswick Counties, where these two counties border Horry County, S. C. The mottled enamel here, as in Horry County, is apparently associated with the use of flowing artesian well water. The other area is in Bertie County, located in the northeastern section of the State. The county seat of Bertie County is Windsor, a community with a population of 1,425. The writer made a detailed examination of 132 children of the sixth, seventh, and eighth grades in the Windsor school. Twenty-two of these pupils had used the Windsor municipal water exclusively from birth, and 19, or 86 percent, showed mottled enamel. The Windsor municipal water supply is obtained from deep wells.

Many of the pupils at the Windsor school come from distances as great as 10 or 12 miles. Consequently the examination gave us a picture of mottled enamel as it existed not only in Windsor but in parts of Bertie County as well. In the group examined, there were

70 children who stated that at no time did they live in Windsor. Among these 70 from the rural districts, there were 43 who gave a history of having lived in the same place and used the same water since birth. Sixteen of the 43 showed mottled enamel, 4 moderately severe, while the remainder ranged from mild to very mild. All gave a history of using shallow well water at home. The dug or driven wells in this area vary in depth from 12 to 25 feet. The only deep-well water (artesian) used by these children was that consumed at the Windsor school. The children from the rural districts who show mottled enamel are, in the main, from that section of Bertie County east and northeast of Windsor

NORTH DAKOTA

In addition to the town of Lidgerwood, referred to by McKay (9), reports from various dentists indicate that mottled enamel occurs in the following counties:

Dickey County: Dr. H. E. Thomas, of Ellendale, calls attention to mottled enamel in this county among the users of artesian water. Dr. H. F. O'Connor, of Oakes, states that probably 90 percent of the children in the eastern part of Dickey County and the western part of Sargent County using artesian water are affected.

Ransom County: Dr. George A. Nelson, of Enderlin, and Dr. Arthur B. Ostrander, of Lisbon, state that mottled enamel is quite prevalent among children on farms where artesian water is used.

Richland County: Dr. R. M. Johnson, of Wyndmere, writes that the majority of the inhabitants of Wyndmere use surface wells and are free from mottled enamel, but on the farms near Wyndmere, where artesian water is used, mottled enamel is being produced in the children. Dr. A. R. Thomason, of Hankinson, reports cases in the western part of the county toward Geneseo.

Sargent County: Dr. K. J. Cole, of Milnor, estimates that 75 to 80 percent of the children are affected, and he associates the condition with the use of artesian water. Dr. E. G. Movius, formerly of Lidgerwood but now of Mohall, also calls attention to this district and states that mottled enamel is endemic at Cayuga and Geneseo.

OKLAHOMA

Six dentists and a physician report mottled enamel in Guymon, Hooker, and certain sections of the southeastern section of Texas County and the southwestern part of Beaver County. The report of Dr. Carl Puckett, managing director of the Oklahoma Tuberculosis and Health Association and submitted by Dr. T. W. Sorrels, chairman of the oral hygiene and educational committee of the Oklahoma State Dental Society, contains much relevant data respecting mottled enamel

in this region. Dr. Puckett also notes an observation made by McKay (18). His tabulations indicate a slightly lower incidence of dental caries among those with mottled enamel than is present in a similar school group in another part of the State where mottled enamel is not endemic.

Dr. Hugh Jeter, of Oklahoma City, calls attention to an area at Bluejacket in the northeastern section of the State, where mottled enamel is reported as endemic. Mr. H. J. Darcey, State sanitary engineer, writes that the inhabitants of Bluejacket obtain their domestic water supply from individual wells.

OREGON

Dr. E. E. Gray, secretary of the Central Oregon District Society, reports a small area 32 miles north of Bend, Oreg. Dr. Gray states that the affected area is a small community near Opal City in Jefferson County, known as Opal Springs. In 5 white families there were 3, 3, 2, 1, and 2 cases, respectively, while in 1 Japanese family there were 3 cases of mottled enamel, or a total of 14 cases. All of these 14 were in children who were born there, their ages ranging from 8 to 19 years. Dr. Gray states that the water supply was obtained from a 2,000-foot "railroad" artesian well which was sunk in 1910. This well was used until about 3 years ago. In addition, Smith and Smith (12) report an endemic area at Talent.

SOUTH CAROLINA

As in North Carolina and Virginia, mottled enamel in South Carolina is apparently limited to communities lying in the Atlantic coastal plain.

Horry County: Dr. Carl Busbee, president of the Pee Dee Dental Society, reports the city of Conway and Horry County as endemic areas. There is likewise a reference to the presence of mottled enamel in Conway in a recent publication by Smith and Smith (12). The writer surveyed this area during April 1932. Conway has a population of 3,011, and its municipal water is obtained from three artesian wells, a 3½-inch well put down in 1896 to a depth of 450 feet, a 10-inch well drilled in 1918 and 400 feet deep, and a 3-inch well drilled in 1924 to a depth of 305 feet. All wells are cased down to the first rock. In addition to the municipal water supply, there are about 30 flowing wells within the city limits. There are likewise many flowing wells in the smaller communities and surrounding rural districts of the county.

One hundred and four children were examined at Conway and 15 at Myrtle Beach. Detailed examination of each tooth, with chron-

ological water history of each individual, was made and recorded as follows:

Group A	Entire sixth grade, Conway white school	59
Group B	Selected cases from the eighth grade of the Conway Junior High School (individuals who had never lived in Conway)	28
Group C	Special cases	17
Group D	Myrtle Beach grade school	15
		119

In group A there were 14 children who stated that they had used Conway water exclusively from birth. All showed mottled enamel, the majority in a moderate to severe degree. An analysis of cases listed under groups B and C indicates that the same factor which is apparently causing mottled enamel among the children in the city of Conway is likewise operative among those individuals from the rural districts who use artesian water during the period of calcification of their permanent teeth.[2] A shifting population with consequent broken water histories obviated drawing any inferences from the examinations listed in group D.

Berkeley County: Dr. J. K. Fishburne, county health officer at Moncks Corner, reports that an examination of 11 schools in the county disclosed 297 cases of mottled enamel varying in degree from very mild to moderate. In March 1933 the writer visited this county and observed mottled enamel in two widely separated sections. At the Chicora school, near Cross and the Orangeburg County line, a few mild to moderate cases of white opaque type of mottled enamel were observed. All cases were associated with the use of deep-well water. One family on Route No. 31 near the Orangeburg County line showed a typical mottled enamel involvement. There were eight children in the family and only the oldest, aged 18, was free from the defect.

[2] Although statements of previous investigators (16) (6) indicate that lesions corresponding to human mottled enamel have not been observed in domestic animals of endemic areas, the writer in studying the literature on this subject found that a lesion of the permanent teeth of ruminants, horses, and other animals had been observed in North Africa, where it is known as "Le Darmous" (1) In this connection it may be interesting to mention that the writer has succeeded in finding instances of "Le Darmous", or animal mottled enamel, in the United States. An examination of a score or more of cows in Horry County, S.C, indicated that these developmental imperfections may show in the permanent teeth of cows which drink continuously of artesian waters showing a high fluoride content. It was possible to find three cows, about 4 years of age, whose consumption of artesian water from birth had been quite constant Although the centrals and first laterals showed little other than an abnormal dullness, the second laterals and corner teeth showed definite developmental imperfections which we would be justified in considering the analogue of human mottled enamel The second laterals and corner teeth, according to Chauveau (The Comparative Anatomy of the Domesticated Animals, by A. Chauveau, revised by S Arloing, Second English Edition translated and edited by George Fleming. D Appleton & Co, New York, 1905) erupt at about 3 and 4 years of age, respectively In 2 of the 3 cases, children of the household using the same water as did the cows showed a moderately severe mottled enamel In the third case, there were no children in the house, but the well water on analysis showed considerable amounts of fluorides Cows imported from other counties (nonendemic areas) did not show this developmental dystrophy. This study is being continued and it is hoped other instances of its occurrence in the United States may be found.

The youngest, aged 6, showed questionable signs on the few permanent teeth present, while the remaining six children showed definite signs of mottled enamel ranging from very mild to a moderate degree of involvement. The water apparently causing the dystrophy was from a well 93 feet deep but cased down only 36 feet.

In the northeastern section of the county there is a logging community known as Witherbee. About a dozen families are supplied with water piped to their individual homes from a storage tank. The water is obtained from a well 289 feet deep which was put down in 1926. This water is apparently affecting all the children using it, some showing a moderate degree of involvement. The older children show the lesion only on the cuspids, bicuspids, and second molars, the teeth calcified earlier being normal The younger children show the characteristic manifestations of mottled enamel on the first molars and incisors.

Charleston County: The possible relationship between rock phosphate deposits and mottled enamel will be referred to more completely in that portion of this paper relating to Tennessee. The phosphate deposits of Charleston County have been described in detail by Rogers (21), and a survey of certain of these areas in the northern part of the county was made with the assistance of Dr. Leon Bonov, the county health officer. Seven cases of very mild to mild, white, opaque mottled enamel were observed among colored children using water from two shallow wells in these phosphate areas. These two wells are located between Johns Island and Lambs. The evidence relative to mottled enamel among users of shallow wells in this particular rock phosphate area is indefinite, and conclusions are apparently not justified by the evidence available at the present time.

Mottled enamel associated with the use of water from deep wells is, however, not uncommon in this county. At the Red Top colored school near the Johns Island railroad station, 13 cases among the 54 children examined were noted. Many of these were moderate to severe in degree of involvement, a few showing brown stain on the incisors Eight gave a history of drinking water from the artesian well at the Johns Island railroad station. The others were found to be associated with water from two other nearby deep wells. Other examinations in various schools indicated that other deep wells in the rural districts of the northern part of this county were likewise producing mottled enamel, but none as severe as noted around Johns Island.

SOUTH DAKOTA

Areas of mottled enamel in South Dakota were reported as early as 1918 by McKay (22), who demonstrated its presence by a survey at Britton, Kidder, Langford, Pierpont, Andover, Groton, and Aberdeen,

all apparently associated with the use of artesian water during the period of calcification of the permanent teeth Five questionnaires were sent to the district dental societies in the State. One reply, from the Second District Dental Society, has been received In addition, questionnaires were mailed to 142 individual dentists in 29 different counties. Seventy-eight replies have been received from these individual dentists, many of them supplying much supplemental data. Many of these questionnaires were sent to dentists solely on the basis of the type of water used in their communities, which, in turn, were based on the geological reports of Darton (23).

A report by counties follows:

Beadle County: Dr. George A. Youel, of Huron, writes that mottled enamel is not endemic among the children of Huron, which uses a filtered river water for its municipal supply. Dr. Youel calls attention, however, to mottled enamel in areas using artesian water and particularly refers to Cavour, Yale, Iroquois, and nearby farms. Several other dentists of Huron call attention to mottled enamel in the northern half of the county bordering on Spink County. Dr. A. A. Wollman particularly calls attention to the neighborhood around Hitchcock.

The writer examined 63 children in the school at Wessington. There was one mild case of mottled enamel and four cases very mild to questionable. The one mild case was in a child from a nearby country district who had used artesian water exclusively from birth. At Wolsey, the school was not in session and the writer examined 14 children on the street. There were four moderate to severe cases of mottled enamel generally associated with the use of the artesian city water.

Bon Homme County: Six replies indicate that this county is apparently negative.

Brookings County: Six replies from dentists indicate that this county is negative.

Charles Mix County: Four replies from this county fail to point to any outstanding area. One dentist reports mottled enamel around Wagner, but the information at present is indefinite. This county is being listed as negative pending further information.

Davison County: Replies from seven dentists in Mitchell indicate that this county is nonendemic for mottled enamel.

Faulk County: Dr. Max H. Moore, of Faulkton, is of the opinion that the mottled enamel cases being produced in this county are, in the main, from around Chelsea, in the northeastern part of the county.

Hand County: The writer examined the pupils of four schools along U.S. Route No. 14 in this county. At Ree Heights 50 children in the fifth, sixth, seventh, and eighth grades were examined. Only one

case of mild mottled enamel was observed, and in this case there was a mixed water history. At the Spears school, midway between Ree Heights and Miller, 14 children were examined. Eight of the 14 showed a mild degree of white, opaque mottled enamel associated with the use of artesian water. At Miller, 102 children in the sixth, seventh, and eighth grades were examined. Thirty-eight cases of mottled enamel were observed, practically all of which were of a mild type. At St. Lawrence, 46 children in the fifth and sixth grades were examined, of whom 19 showed mottled enamel. Seven of the nineteen, principally from the country districts, showed mottled enamel in a moderate to severe form. Two other individuals in the high school who had used water from artesian wells on the outskirts of the community showed a severe form of mottled enamel. The characteristic brown stain was present in many of these moderately severe cases. At Vayland 11 cases of mottled enamel were observed among the 25 persons examined. These were all of a mild type, and no brown stain was observed.

Hughes County: The children in five schools, 76 children, from Pierre to Harrold were examined. In the one mild case observed in this entire group the affected teeth had apparently calcified while the child was living in Lyman County, where mottled enamel is occasionally observed in children living on ranches where deep well water is used. At Harrold, however, an examination of 58 children showed 9 cases of mottled enamel, varying from moderate to severe, several showing marked brown stain. The mottled enamel and brown stain observed at Harrold was similar to that observed at St. Lawrence and more severe than any noted in the various schools along Route No. 14 between Pierre and Wolsey.

Kingsbury County: Dr. P. L. Scofield of De Smet reports a high incidence of mottled enamel in the western third of the county associated with artesian water. Dr. W. C. Gross reports a high percentage of children affected in Iroquois, with many showing the characteristic brown stain. Dr. M. G. Jenson of Lake Preston reports a high incidence of mottled enamel in Lake Preston associated with the use of artesian water. Bancroft, in this county, has also been reported as an endemic area.

Miner County: Dr. Leo V. Schueller of Howard states that mottled enamel is very prevalent in the western half of the county and particularly refers to Fedora, Roswell, and Vilas. Dr. Albert S. Bensend, of Carthage, reports that a high percentage of children in Carthage are affected and adds that the condition is also present in Esmond and the western part of the county.

Roberts County: Dr. A. R. Sorbel and Dr. J. A. Robertson, both of Sisseton, write that there are areas where mottled enamel is endemic in this county. Dr. Robertson further calls attention to the fact that

Roberts County is composed of hills to the west which rise to a height of 2,000 feet and the Whetstone Valley to the east. Many artesian wells have been sunk in the Whetstone Valley during the past 20 years and water is obtained at depths of from 700 to 900 feet Doctor Robertson notes that children drinking artesian water in the valley invariably show mottled enamel, while those from the hill country, although separated by only a few miles, are not affected.

Sanborn County: Dr. D. St. I. Davies, of Woonsocket, makes some interesting comments relative to Woonsocket and neighboring communities going back over a period of 50 years. He states that when the county was first settled and the inhabitants depended on creeks or shallow wells, near sloughs, there was no mottled enamel. Then in the early 90's deep artesian wells (around 700 feet deep) were put down. Water from these wells produced mottled enamel. He further adds that within recent years, so-called "soft water" wells (about 200 feet deep) have been used more and more and children calcifying their permanent teeth while using this water are free from the defect. Doctor Davies has offices both in Woonsocket and Artesian and states that mottled enamel is more frequently observed in Artesian than in Woonsocket, where the gradual change in the water supply has almost eliminated it. Dr. Leo V. Schueller, of Howard, also refers to Forestburg, between Woonsocket and Artesian, as an endemic area.

Spink County: Dr. Clyde A. Peterson, of Doland, writes that approximately 50 per cent of the children show mottled enamel, associates it with the use of artesian water, and localizes it in the eastern part of the county. From Dr. V. P. Poulson, of Conde, comes another interesting report. He states that a high percentage of individuals are affected wherever artesian water is used and especially reports its presence in the northern section of the county where Conde is located. From Redfield, in the western part of the county, and a little to the south, Dr. Earl F. Harrington writes that he sees only a few cases and these apparently from the northern section of the county. Dr. W. G. Gross, of Iroquois, states that mottled enamel is endemic at Frankfort.

TENNESSEE

No reply was received from the query sent to the secretary of the Tennessee State Dental Association, and questionnaires were sent to the secretaries of the 10 component societies as listed in Polk's Dental Register (1928). In answer to these 10 requests for information, one reply was received. This was negative.

In view of the extensive deposits of natural phosphates in the State, further study was deemed advisable. Certain rock phosphates, according to Marshall, Jacob, and Reynolds (24), show a fluorine content as high as 3 or 4 percent. These investigators found that a number of samples from Tennessee contained more than 3 percent.

A report by Waggaman (25) gives a detailed description of the location of the Tennessee natural phosphates, while other work of interest in connection with this study is that of Carter (26) relative to the solubilities of inorganic fluorides in water.

Two counties in Tennessee, Maury and Hickman, were visited. At Mount Pleasant the two dentists stated that they see mottled enamel at times and that the cases are apparently from the rural sections. The municipal water supply of Mount Pleasant is brought a distance of about 10 miles, and its source is in a limestone region. About a quarter of a mile, however, from Mount Pleasant there is a small settlement of a dozen or more colored people who obtain their drinking water from a spring which comes out through a phosphate formation. Six children who had used water from the spring during the period of calcification of their permanent teeth were examined. Four showed a "mild" degree of involvement of the white opaque type of mottled enamel. One negro girl, age 11, who had used this spring for the past 3 years only, showed definite markings of mottled enamel on all of the bicuspid teeth, while the remaining teeth were normal. A mining community about 5 miles from Mount Pleasant was next visited. The water supply of this community is obtained from a well 65 feet deep and reported as cased its entire depth. The natural phosphate deposits in this particular area are about 20 feet deep and the community water supply is apparently obtained from a source considerably below the phosphate deposit. No mottled enamel was observed in about a dozen children examined.

In Hickman County, a small mining settlement at Twomey was visited. The water supply there is obtained from a spring known as "Twomey Springs" which issues from a phosphate deposit. The mining superintendent stated that this particular phosphate was high in fluorine. In one family there were three children who had used this spring exclusively from birth. Their ages were 8, 10, and 13, respectively. All showed a mild type of white, opaque mottled enamel, one in addition showing the characteristic brown stain on the superior incisors. Another family with a child aged 10 had moved into the community 3 years previously. The second bicuspids of this child showed mottled enamel while all other teeth were normal. A fifth child, aged 13, gave a mixed history of drinking water, having used water from both Twomey Springs and a surface well. This child showed questionable markings on the central incisors and one bicuspid while all the remaining teeth were apparently normal.

The finding of mottled enamel in children who had used water passing over or through rock phosphate deposits is of interest. Velu (27) reports a similar condition in North Africa known as "le darmous." In the opinion of Velu, "le darmous" is caused by the ingestion of small amounts of fluorine present in the drinking water as a fluoride,

due to its passage over or contact with the beds of natural phosphates. "Le darmous" has been studied during the past 10 years at the Institute of Pasteur in Algiers, and their animal experiments and investigations become of value in connection with the study of mottled enamel. From Velu's description, illustration, epidemiological data, and apparent causative factor, we infer that "le darmous" and mottled enamel are identical.

TEXAS

In 1916, McKay (3) called attention to certain mottled enamel areas in Texas. Pierle (28) later states, from data obtained from students at a college at Canyon, that "the area in Texas alone, mapped from data collected from the student body of the West Texas State Teachers' College, includes 86 of the 252 counties of Texas." The counties in the State affected were not stated. In a recent article on the geographical distribution of mottled enamel, McKay (9) states with respect to Texas: "The distribution over Texas is so widespread that no detailed cataloging of the communities is here possible, but reports indicate that the northwest portion known as the Panhandle constitutes by far the most extensive afflicted area in the country, and involves more people. A definite deep-well association has been reliably established. There are afflicted localities in other parts of the State."

In view of the widespread distribution of mottled enamel in Texas, two forms of survey were followed. As was the custom in each State, a questionnaire was sent to each component or district society in the State. In addition, 59 counties of the Panhandle and west Texas were made the object of a more intensive and complete survey.

Excluding the counties in the Panhandle and west Texas, the only area reported in the replies received from the various component societies is one at Taylor, in Williamson County, where it is estimated that there are 1,000 cases, and where the Austin Dental Society states that the condition is associated with the use of drinking water obtained from artesian wells. This report has likewise been confirmed by individual reports from dentists practicing in Taylor.

THE PANHANDLE AND WEST TEXAS

In order to obtain as much information as possible regarding mottled enamel in the Panhandle, a survey by counties was undertaken. Fifty-nine counties are included in this area. In counties where, according to Polk's Dental Register, there was no dentist practicing or where after a reasonable time no reply was received from the dentist practicing there, a questionnaire was sent to the county health officer. Often there were counties where no dentist was listed, and in these cases the sole report was from the county health officer. There were 13 such counties. In three counties,

Borden, Yoakum, and Loving, it was impossible to find either a physician or a dentist to whom an inquiry could be addressed.

One hundred and twenty-nine questionnaires were sent into this area, 127 to individuals and 1 each to the Amarillo and Panhandle Dental Societies, respectively. Replies were received from 86 individuals and 2 societies, while 4 more were returned marked "unclaimed", "deceased", etc The majority of the answers included valuable supplemental data Excluding the three counties previously referred to where it was impossible to address an inquiry, we find that there are only four counties to which questionnaires were addressed and from which we have no report, or, in other words, we have one or more reports from 52 of the 59 counties being studied. These 52 counties are covered by 86 individual reports and 2 reports from societies.

Information in detail from counties of the Panhandle and west Texas follows:

Andrews County: No record of a dentist practicing in this county. The county health officer states that about 50 percent of the population is affected and that it is localized in the extreme western part of the county associated with deep-well water.

Armstrong County: The only report from this county is that from the county health officer. He reports mottled enamel locally but states that the incidence is only about 5 to 10 percent. He further adds that the water supply is obtained from deep wells 140 to 240 feet in depth.

Bailey County: A report from the county health officer, A. R. Matthews, and jointly signed by A. E. Lewis, D.D.S., states that practically all native-born children are affected. They state that the water is obtained from shallow wells.

Borden County: It was not possible to obtain the name of either a physician or dentist practicing in this county.

Briscoe County: Dr. Ben R. Ezzell, a practicing dentist of Quitague, sends a complete report concerning mottled enamel in this county. He calls attention to the fact that Quitague is located just below the Cap Rock, at an altitude of 2,600 feet. About 10 miles to the west is the top of Cap Rock, where the Great Plains begin at an altitude of 3,100 feet. Dr. Ezzell states that mottled enamel occurs with much greater frequency on the Plains than in the valley. He also states that 3 years ago he examined over 900 school children in this county and found mottled enamel in the mouths of 10 percent of the children living in the valley and 25 percent of the children on the Plains. He states that the South Plains is underlaid with what is known as "the South Plains sheet water", which is tapped at from 20 to 40 feet anywhere. This South Plains water is soft, while the water in the valley is hard. Dr. Ezzell adds that most of the

mottled enamel occurs in the western part of the county around Silverton.

Carson County: Dr. O. York, the county health officer, reports only a few cases in this county and thinks they are confined to the shallow-water belt. The incidence is so low that the county is considered negative.

Castro County: Dr. Mayes Miller, county health officer, states that 85 percent of the native-born children of this county are affected. He also notes that mottled enamel is apparently evenly distributed throughout the county and that the water is obtained from wells 100 to 150 feet deep.

Childress County: Although occasional cases are sometimes seen, replies from three different dentists all indicate that this county is essentially negative.

Cochran County: There is neither a dentist nor a county health officer listed in this county. A questionnaire was addressed to the one physician practicing here but no reply has been received.

Collingsworth County: The report from Dr. W. R. Orr, a dentist who has practiced there for 21 years, indicates that the county is negative.

Cottle County: Dr. W. T. Payne reports that he recently examined the mouths of 300 school children between the ages of 6 and 12. No native-born children of this county showed mottled enamel. The county is listed as negative.

Crosby County: Reports have been received from Dr. F. A. Greene of Crosbyton, and Dr. H. F. Schwab of Ralls. They estimate an incidence of 60 and 50 percent, respectively, and state that the condition is general throughout the county. They add further that the drinking water is obtained from wells 100 to 300 feet deep.

Dallam County: Four replies have been received from this county, 3 from Dalhart and 1 from Texline. They indicate that what cases they see are from other areas, namely, Amarillo, Plainview, Lamesa, and the range country to the south. The county is listed as negative.

Dawson County: Five questionnaires were sent to dentists in this county and five replies were received. All reports indicate that mottled enamel is endemic. Dr. R. F. Nix, of Lamesa, for instance, stated that 95 percent of native-born children are affected. All five agree that shallow wells are associated with the dystrophy.

Deaf Smith County: Six questionnaires were sent into this county. Dr. G. W. Heard, a dentist, reports a low incidence, with considerable brown stain. Dr. G. F. Le Grand, a physician, of Hereford, roughly estimates an incidence of 5 percent but states that, due to the shifting population, it is difficult to estimate. He states that the drinking water is obtained from wells which vary in depth from 50 to 300 feet. Although the data with respect to this county is not as complete as

might be desired, it is being listed as an endemic area, since all surrounding counties are endemic areas and the "spot mapping" of the Panhandle as a whole marks it as being in the mottled enamel zone.

Dickens County: Two replies have been received, which indicate a low incidence of mottled enamel. It is apparently more marked in that part of the county around McAdoo, according to a reported survey of school children.

Donley County: This county is apparently negative for mottled enamel.

Ector County: The county health officer, Dr. Emmet V. Headlee, reports this county as negative. No reply was received from the only dentist practicing in the county.

Floyd County: Three replies from this county all indicate that mottled enamel is endemic among the native-born children. Water from wells 100 to 200 feet deep is apparently associated with the dystrophy.

Fisher County: This county is reported as negative.

Gaines County: The county health officer, Dr. A. L. Bradford, reports an incidence of about 75 percent and notes an association with wells about 100 feet in depth.

Garza County: The county health officer, Dr. D. C. Williams, conservatively estimates that 50 percent are affected and notes an association with deep-well water.

Gray County: This county is reported as negative.

Hale County: Three replies were received from this county. Dr. P. E. Berndt estimates that 40 to 50 percent are affected, while both Dr. C. D. Wofford and Dr. W. J. Lloyd estimate that at least 90 percent are affected. They report both shallow and deep wells, principally shallow wells.

Hall County: Two replies indicate that this county is apparently negative.

Hansford County: A joint report from Dr. G. P. Gibner, county health officer, and Dr. F. J. Daily, a dentist, indicates that this county is negative.

Hartley County: No replies received; two questionnaires sent.

Hemphill County: Dr. E. H. Snyder, county health officer, reports this county negative for mottled enamel with respect to native-born children.

Hockley County: Dr. Ray Ross states that the condition is general throughout the county, and adds that his investigations have shown that mottled enamel is always associated in this county with the use of shallow wells. Those using deep wells or artesians are apparently immune.

Howard County: Four replies from dentists at Big Spring mark this county as questionable. A few cases are reported, but from the

country districts. These cases are apparently a mild, white, opaque type, with little or no brown stain such as is seen farther to the northwest. Dr. E. O. Ellington and Dr. W. B. Hardy report a few cases in the northeast section of the county. This checks up with the fact that a few cases are reported in the southwestern section of Scurry County. Shallow wells are apparently used for drinking water.

Hutchinson County: Dr. W. H. Beckley, of Borger, states that 50 percent of the native-born children are affected in this county.

Jones County: Dr. F. C. Prichard of Anson, reports this county as negative for mottled enamel.

Kent County: Dr. J. H. Fowler, the county health officer, reports this county negative.

King County: No report.

Lamb County: Dr. C. C. Clements reports that nearly every child born at Littlefield has mottled enamel.

Lipscomb County: The county health officer reports the county negative.

Loving County: It was impossible to obtain the name of either a physician or dentist practicing in this county.

Lubbock County: Five replies were received from the city of Lubbock and two from Slaton. The consensus of opinion as conservatively expressed is that at least 50 percent of the native-born children are affected. Most of the cases are apparently associated with the use of shallow wells, but there are some deep wells in the county.

Lynn County: Dr. J. R. Singleton estimates that approximately 60 percent are affected and associates it with the use of shallow wells, which he states are about 110 feet deep.

Martin County: The county health officer reports a very low incidence of mottled enamel in this county. There is no dentist listed as practicing in this county. In as much as dentists in Dawson County to the north and Howard county to the east have both called attention to mottled enamel in Martin County, it is listed as an endemic area.

Midland County: Drs. L. B. Pemberton, K. P. Campbell, and D. K. Ratliff, all of Midland, report a fairly high incidence of mottled enamel in Midland County.

Mitchell County: This county is considered questionable. Dr. B. J. Dunlaney, of Colorado, reports an area about 12 miles to the northeast, but does not know the degree of involvement or the number affected. He states that shallow wells are used.

Moore County: Reports from 2 physicians and 1 dentist indicate that this county is negative for mottled enamel among the native-born children.

Motley County: Dr. E. W. McKenzie reports this county negative although he states that the condition is quite common in the counties to the west in the Plains country.

Nolan County: Three replies indicate that this county is negative for mottled enamel.

Ochiltree County: This county is apparently negative.

Oldham County. Dr. F. A. Collins, the county health officer, reports mottled enamel in this county. There are no dentists listed as practicing in the county.

Parmer County: Dr. J. M. McCuan, the county health officer, reports mottled enamel in this county. There are no dentists listed as practicing in the county.

Potter County: The secretaries of the Amarillo and the Panhandle Dental Societies, reporting from Amarillo, state that a high incidence of mottled enamel exists locally. Apparently deep wells are the sources of water supply here.

Randall County: A report from Dr. S. L. Ingham, a dentist, and Dr. C. A. Pierle, head of the department of chemistry, West Texas State Teachers' College, indicates a high incidence, approximately 75 percent, in this county. They state that both artesian and shallow wells are used.

Roberts County: The county health officer reports the county negative for mottled enamel.

Scurry County: Dr. Sed A. Harris reports only a few cases, those in the southwestern part of the county. It is interesting that a few cases were also reported in the northeastern part of Howard County. Scurry County is listed as questionable.

Sherman County: Apparently negative.

Stonewall County: Apparently negative.

Swisher County: Dr. R. L. Massey reports mottled enamel in this county and states that water is obtained from shallow wells.

Terry County: The county health officer, Dr. T. L. Treadway, reports mottled enamel in this county. No further data.

Wheeler County: Apparently negative.

Winkler County: No reply was received from the inquiry addressed to the county health officer. There is no dentist listed as practicing in the county.

Yoakum County: It was not possible to obtain the name of either a physician or a dentist practicing in this county.

UTAH

Beaver County: Dr. Edgar A. Petty, of Beaver, calls attention to the near-by communities of Greenville and Adamsville, where, he states, 700 to 1,000 are affected. He estimates the incidence at 90

percent for both towns and notes that drinking water is obtained from artesian wells and deep springs.

Washington County: Both Dr. E. H. Conger and Dr. W. C. Cox, of St. George, report mottled enamel in St. George, but note that it is not nearly as severe as formerly. They state that about 20 years ago the water supply was changed. Formerly the entire municipal water supply was obtained from springs and mottled enamel in St. George was very severe. It is not very clear in either report whether the new water supply from Pine Valley mountains is now used exclusively in the municipal supply for domestic purposes, or whether this mountain water has been merely added to the local spring supply. One report states that the St. George spring water is still being used for irrigation of truck gardens and vegetable plots. Both agree that there has been a marked decrease in the incidence of mottled enamel since the change in the water supply.

VIRGINIA

Areas of mottled enamel at Franklin and Courtland, Southhampton County, were reported by McKay (3) in 1916. In 1919, he (13) reported the results of a survey at Franklin. In 1931, the writer examined 222 school children at the Courtland school. These children were from Courtland and the surrounding rural districts within a radius of 6 or 7 miles. In this group were 29 children who had lived in Courtland and used artesian water exclusively from birth. Twenty-eight, or 96 percent, showed definite signs of mottled enamel. The one remaining case, listed as negative, was in a 6-year old child whose erupted permanent teeth were limited to the lower central incisors. The water supply in Courtland is obtained from individual flowing artesian wells. Reports from the State department of health indicate that mottled enamel is present at Smithfield (confirmed by Dr. W. C. Ames, a dentist of Smithfield), Rescue, Battery Park, and Carrollton in Isle of Wight County and Chuchatuck in Nansemond County. Dr. W. L. Smoot, of Williamsburg, writes that practically all native-born children of Jamestown Island are affected. He states that artesian water is used for drinking purposes.

QUESTIONABLE AREAS

Questionable areas include parts of Howard, Mitchell, and Scurry Counties, Texas; Dona Ana County, New Mexico; and the "South Pass and Atlantic City" district in the southern part of Fremont County, Wyoming.

SUMMARY

There are 97 localities which have either been referred to in the literature as areas where mottled enamel is definitely demonstrable

or areas reported by questionnaires and subsequently confirmed by survey of the locality.

There are, in addition, 28 areas referred to in the literature as mottled-enamel areas. No confirmatory surveys are reported, but little doubt exists as to the production of mottled enamel in these regions. They are, in the main, in the Panhandle and west Texas.

There are 70 areas which have been reported by questionnaires but which have not as yet been confirmed by extensive surveys.

There are 5 areas reported by questionnaires which are held as questionable pending receipt of further data.

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THE HYDROLYSIS OF THE PHENYL AND CRESYL PHOSPHORIC AND PHOSPHOROUS ACID ESTERS IN ALCOHOLIC AND AQUEOUS SYSTEMS

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In previous communications from this laboratory experiments were reported to show the rate of hydrolysis of the phosphoric and phosphorous acid esters of phenol and of the three cresols in absolute

alcohol with varying concentrations of KOH (1) (2). The rate of hydrolysis in these experiments was measured in terms of the respective phenols set free under the experimental conditions. Briefly, the experiments showed that in the presence of KOH the more stable phosphoric esters decomposed in absolute ethyl alcohol at a rate proportional to the concentration of the alkali, while the less stable phosphorous acid esters decomposed also in absolute alcohol alone, provided sufficient time was allowed. It appeared probable that the decomposition reaction of these esters in alcohol might be different from that in an aqueous system. A series of experiments was therefore undertaken to compare the products of hydrolysis, i.e., the phenols and the phosphorus, at different stages of decomposition of these esters in aqueous and alcoholic systems. The results of these experiments demonstrate that in aqueous systems the esters decompose into the corresponding phenols and inorganic phosphorus, while in alcohol inorganic phosphorus does not accompany the liberation of the phenols. Moreover, these experiments also show that there is a disproportionate liberation of inorganic phosphorus and phenols in the case of aqueous hydrolysis of some of the phosphoric esters, indicating the formation of intermediary compounds. Lastly, these experiments suggest that the role of KOH in the decomposition of the esters in alcohol may be in the nature of a catalyst.

EXPERIMENTAL

Hydrolysis in alcohol.—The hydrolysis of the esters in ethyl alcohol and the estimation of phenols in the hydrolysate at various stages have been previously described (1). Stated in terms of time required to effect 75 to 85 percent hydrolysis of a 1 percent solution of triorthocresyl phosphate as determined by the orthocresol set free at 25° C. under different concentrations of KOH, the results may be summed up as follows:

2.5 N KOH	20 minutes.
0.5 N KOH	2 hours.
0.1 N KOH	3

The phosphoric esters of phenol and meta and para cresol were not studied in as great detail, but in general they did not differ materially from the orthocresyl compound.

The phosphorous acid esters of the phenols also presented relatively little difference among themselves. They were much less stable, however, than the phosphoric esters. The hydrolysis of 1 percent triorthocresyl phosphite in absolute ethyl alcohol with and without KOH at 25° C., as expressed in terms of time required to split off 90 to 100 percent of the available orthocresol, may be given as follows.

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0.1 N KOH	10 minutes.
0.01 N KOH	2 hours.
No KOH	2 days.

No inorganic phosphorus could be demonstrated in any of the above alcoholic hydrolysates.

Aqueous hydrolysis of the phosphoric esters.—These experiments were carried out by refluxing 1 percent of the respective esters in half-saturated aqueous solution of NaOH for a definite length of time, at the end of which analyses were made for the corresponding phenols and for inorganic phosphorus. The method for phenol estimation was the same as that previously described. The inorganic phosphorus was estimated colorimetrically by the method of Fiske and Subbarow (3). In order to insure freedom from silica, the inorganic phosphate was precipitated in a definite volume of hydrolysate with 10 percent $CaCl_2$ in saturated solution of $Ca(OH)_2$ after the reaction of the hydrolysate had been adjusted to just alkaline to phenolphthalein. The combined precipitate was washed by centrifugation and the phosphate separated by solution in dilute H_2SO_4 and centrifugation. The quantity of phosphorus so estimated at any one time varied from about 0.08 to 0.3 mg. Control experiments showed that the methods employed herein for estimation of the phenols and of inorganic phosphorus were accurate within ± 5 percent.

TABLE 1.—*Aqueous hydrolysis of the phenolic phosphoric esters on refluxing with half saturated NaOH*

Compound	Percent hydrolysis on basis of phenols (A) and phosphorus (B)							
	1 hour		2 hours		5 to 6 hours		9 to 15 hours	
	A	B	A	B	A	B	A	B
Triphenyl phosphate	82	37	94	80	100	102		
Triorthocresyl phosphate			60	9	89	46	102	97
Trimetacresyl phosphate			73	71	80	87	96	99
Triparacresyl phosphate			62	20	89	58	91	82

On comparing the inorganic phosphorus estimated in parallel with the respective phenols at different stages of hydrolysis of the several phosphoric esters, it appears that there is a lag of the former in all the esters examined except the metacresyl, as shown in table 1. Triphenyl phosphate appears to be the least stable of the four compounds. The disproportionate phenol and phosphorus findings in the instance of the phenyl, orthocresyl, and paracresyl esters suggested the formation of intermediary compounds. This finds support in the fact that similar hydrolysis experiments carried out upon the

phosphoric diester and monoester of orthocresol[1] showed disproportionate orthocresol and phosphorus in the former only, as follows:

Hydrolysis period	Dicresyl ester		Monocresyl ester	
	o-cresol	Phosphorus	o-cresol	Phosphorus
2 hours	10	10	27	27
5 to 9 hours	70	53	48	47
14 hours	--- ---	-------	71	69

It is significant that these two compounds do not hydrolyse in absolute ethyl alcohol at 25° C. in any concentration of KOH up to 2.5 N. One such experiment in 2.5 N KOH extended over a period of 9 days, with no evidence of any orthocresol having been split off.

Aqueous hydrolysis of the phosphorous acid esters.—These experiments were made with 1 percent suspensions of each of the four esters in water for a definite length of time and at a constant temperature. At the end of the hydrolysis period the suspension was filtered through hard filter paper and the phenols and the inorganic phosphite-phosphorus determined in the filtrate. Since phosphite-phosphorus must first be converted to phosphate-phosphorus before it can be estimated by the method of Fiske and Subbarow, it was necessary to work out a procedure of oxidation of phosphite to phosphate-phosphorus without interfering with its estimation. The procedure which proved satisfactory consisted of treating a quantity of hydrolysate representing 0.1 to 0.3 mg phosphite-phosphorus with 1 cc N $KMnO_4$ and about 0.5 cc 10 N H_2SO_4 on the water bath at 50° C. for half an hour. The mixture is then *cooled* and the estimation of inorganic phosphorus is continued in the usual manner.

The results of these experiments showed that all of the four phenolic phosphites can be decomposed nearly completely in water in 1 to 3 hours at 80° to 100° C. and partial decomposition may be effected in 15 to 60 minutes at 60° to 80° C. Determination of inorganic phosphite-phosphorus at various stages of hydrolysis usually showed an approximately close parallelism with the respective phenols, indicating the simple decomposition of the phenolic phosphites in water into the phenols on the one hand, and phosphorous acid on the other.[2]

[1] The preparation and pharmacologic action of these compounds will be described in a separate publication.

[2] In several of the hydrolysates in which some 30 to 80 percent of the esters had decomposed, the inorganic phosphite-phosphorus values were somewhat higher than the corresponding values for the phenols. This discrepancy we believe is probably due to increasing solubility of the esters in their products of hydrolysis as compared with that in water. Consequently, as hydrolysis progresses, a small amount of the undecomposed ester may go through the filter, and this would be decomposed in the course of oxidation of the phosphite prior to its determination as phosphate. No discrepancy, beyond the limits of experimental error, was noted in the phosphorus and phenol or cresol values in the early stages of hydrolysis nor at the end when decomposition was complete.

DISCUSSION

The foregoing experiments demonstrate that the phosphoric and phosphorous acid esters of phenol and of the three cresols may undergo two distinctly different types of cleavage according to the medium in which hydrolysis takes place. In aqueous systems the phenols are set free, and along with them inorganic phosphorus is split off. In absolute ethyl alcohol the phenols are also set free, but no inorganic phosphorus can be demonstrated as a product of hydrolysis. Since no inorganic phosphate can be demonstrated at any time in ester-alcohol-KOH systems even after all the available phenols have been set free, and no free phenols can be demonstrated in the phosphoric ester-alcohol system unless some KOH is present, it would seem that the alkali must play an indirect, though essential, part in this reaction.

An experiment with 1 percent solution of triorthocresyl phosphate in absolute alcohol and 0.1 N KOH at 38° C. showed a rapidly progressing rate of hydrolysis with respect to the liberated orthocresol, so that by the fifth day nearly all the available orthocresol was split off. No inorganic phosphorus could be detected in the hydrolysate. The titrable alkali (titrated against N/50 H_2SO_4) did not change in the entire course from the first day, when the hydrolysate contained a mere trace of free orthocresol, to the fifth day, when it contained 86 percent of it, indicating 98 percent decomposition. To account for these facts the following would seem to be the probable reaction.

$$(C_6H_4CH_3O)_3PO + 3C_2H_5OH \text{ and } KOH \rightarrow 3C_6H_4CH_3OH + (C_2H_5O)_3PO$$
$$\text{or } (C_6H_4CH_3O)_3PO + 3C_2H_5OK \rightarrow 3C_6H_4CH_3OK + (C_2H_5O)_3PO.$$

A similar experiment with 1 percent ester and 0.01 N KOH in absolute alcohol at 38° C. likewise showed a progressive, though slow, rate of hydrolysis, attaining approximately 28 percent orthocresol by the seventh day and 38 percent by the twenty-eighth day. The pH of this solution, being about 8, showed no appreciable change throughout the experimental period. Since the degradation of the tricresyl ester to the dicresyl ester is accompanied by liberation of 29.3 percent orthocresol, it would appear that the state of decomposition of the foregoing 1 percent solution by the seventh day might be expressed by the following equation:

$$(C_6H_4CH_3O)_3PO + C_2H_5OH \text{ and } KOH \rightarrow C_6H_4CH_3OH + \left.\begin{matrix} C_2H_5O \\ C_6H_4CH_3O \\ C_6H_4CH_3O \end{matrix}\right\rangle PO.$$

And since, with an excess of ester such as we have in a 1 percent solution 0.01 N KOH could not possibly yield more than 10.8 percent orthocresol if its liberation were conditioned upon the direct chemical interaction of ester and alkali, the conclusion that the role of the KOH must be indirect seems justified.

We believe that this difference in hydrolysis of the phosphoric and phosphorous esters of the phenols in aqueous and alcoholic systems may prove important in elucidating the mechanism of their pharmacologic action. We had previously suggested hydrolysis *in situ* of the nervous system as a probable explanation for the specific neurotoxic action of some of these esters. The probable mechanism for such assumed hydrolysis *in situ* was not apparent. In line with the experimental evidence described herein, it seems probable that phenolic esters may undergo two distinct types of hydrolysis in the animal body as *in vitro*—extraneural hydrolysis, possibly similar to aqueous hydrolysis *in vitro*, and intraneural hydrolysis similar to that in alcohol *in vitro*. For the latter it is necessary only to assume that certain normally occurring chemical constituents of the nervous system may be capable of exerting an influence similar to that of KOH on the decomposition of the neurotoxic esters in an alcohol-like medium, such as the cholesterol of the nervous system. The products of extraneural hydrolysis may be supposed to be readily detoxified, while those of intraneural hydrolysis, being subject to a different fate, might very well exert a lasting influence resulting in degeneration of the neuron.

CONCLUSIONS

Studies on the products of hydrolysis of the phenolic phosphoric and phosphorous acid esters in aqueous and alcoholic systems showed that in the former, inorganic phosphorus occurs along with the phenols, while in the latter the phenols may be split off quantitatively with no inorganic phosphorus accompanying them.

Parallel determinations of the inorganic phosphorus and the phenols in the aqueous hydrolysates of the phosphoric esters indicate the formation of intermediate esters, probably of the di- and mono-ester type, in all except the trimetacresyl phosphate.

No such intermediary products appear to form in the course of aqueous hydrolysis of the phosphorous acid esters of the phenols.

It is suggested that the two distinctly different types of hydrolysis of the phosphoric and phosphorous esters of the phenols in aqueous and alcoholic systems may be significant in accounting for their peculiarly specific pharmacologic properties.

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COURT DECISION RELATING TO PUBLIC HEALTH

Statute relating to labeling of packages used in shipment and transportation of clams construed.—(Maine Supreme Judicial Court; *State* v. *Chadbourne*, 164 A. 630; decided Feb. 18, 1933.) A 1931 statute provided, in part, as follows:

All packages used in the shipment and transportation of clams from town to town and from a place within the State to a place without the State shall bear a label which, in plain and distinct letters and figures, shall state the name and license number of the consignor and the name of the consignee, the word "clams", the date of shipment, and the name of the town in which the clams were dug.

The defendant, who was duly licensed to buy and sell clams and to transport them from place to place in the State, delivered by truck to a customer in a neighboring town 6 bushels of clams in open bags. No labels were affixed to the bags, but inside of each bag there was a tag upon which was written all of the information called for by the above-quoted statute. The defendant was convicted of a violation of the statute, and the case came before the supreme court on exceptions to the refusal of the presiding justice to direct a verdict of not guilty.

The supreme court said that reference to the law disclosed its purpose to be the prevention of the sale of clams taken from contaminated areas, and that the label was especially important as from it could be ascertained the place where the clams were dug, which was the vital fact to be determined if the law was to be of benefit to the public. "Taken literally," said the court, "section 7 would not apply to the case at bar. It apparently refers to closed packages. The word 'clams' was to appear on the label. Quite obviously this would be superfluous if the package were open." The court then went on to say that it was also clear that the language was not strictly applicable to personal deliveries by vendor to vendee. Said the court:

* * * We do not speak of a direct delivery by a seller of goods to a buyer as a "shipment", nor do we designate the parties to such a transaction as "consignor" and "consignee." These terms imply something quite different than appears in the case before us.

After considering definitions of the terms "shipment", "consignor", and "consignee", the court held that there was no "shipment" in the instant case, saying:

* * * There may be "transportation" but not "shipment and transportation." The words appear conjunctively in the statute, and, taken together, carry a much broader implication than does the word "transportation" alone. There is no consignment, no consignor, no consignee. There is no closed package. There is a delivery of an open receptacle by a seller to a purchaser.

This, however, according to the court, would not excuse failure to label, but it took the view that there had been no such failure, stating as follows:

* * * The real object of the law must be kept in mind; namely, to convey to purchasers and wardens information from which could be determined whether or not the clams came from contaminated areas.

Under the circumstances shown here, the method of labeling adopted by respondent was sufficient. The label was filled out in accordance with law. It contained all of the information required. The only complaint is that it was inside instead of outside the open bags in which the clams were carried.

The purpose and intent of the statute were carried out. * * *

The defendant's exceptions were sustained.

DEATHS DURING WEEK ENDED JUNE 3, 1933

[From the Weekly Health Index issued by the Bureau of the Census, Department of Commerce]

	Week ended June 3, 1933	Corresponding week, 1932
Data from 85 large cities of the United States		
Total deaths	7,148	7,491
Deaths per 1,000 population, annual basis	10.0	10.7
Deaths under 1 year of age	489	618
Deaths under 1 year of age per 1,000 estimated live births [1]	41	50
Deaths per 1,000 population, annual basis, first 22 weeks of year	11.7	12.3
Data from industrial insurance companies.		
Policies in force	67,920,937	72,901,860
Number of death claims	10,313	11,261
Death claims per 1,000 policies in force, annual rate	7.9	8.1
Death claims per 1,000 policies, first 22 weeks of year, annual rate	10.6	10.3

[1] 81 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended June 10, 1933, and June 11, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 10, 1933, and June 11, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended June 10, 1933	Week ended June 11, 1932	Week ended June 10, 1933	Week ended June 11, 1932	Week ended June 10, 1933	Week ended June 11, 1932	Week ended June 10, 1933	Week ended June 11, 1932
New England States:								
Maine	2	4	3	1	2	91	1	0
New Hampshire		2			15	51	0	0
Vermont					63	185	0	0
Massachusetts	21	37		3	613	1,014	0	3
Rhode Island	5	8			3	33	0	0
Connecticut	2	4	1	1	191	255	0	0
Middle Atlantic States:								
New York [1]	44	60	[2] 4	[2] 9	1,785	2,409	4	7
New Jersey	20	32	1	2	981	972	0	1
Pennsylvania	39	52			1,165	1,015	5	5
East North Central States:								
Ohio	22	23		14	417	2,327	1	5
Indiana	7	15	12	3	141	181	3	2
Illinois	19	75	19	9	545	861	8	4
Michigan	31	14	2	4	670	3,101	1	2
Wisconsin	5	16	16	5	153	1,181	2	1
West North Central States:								
Minnesota	6	11	2	1	190	114	1	1
Iowa	6	5			66	4	1	0
Missouri	18	22		2	164	57	2	3
North Dakota	3	3			69	27	0	1
South Dakota	1	13			19	6	0	0
Nebraska	6	5			194	4	1	0
Kansas	11	5			171	251	0	1
South Atlantic States:								
Delaware		1			11	2	0	0
Maryland [1,3,4]	9	11	3	5	33	35	1	1
District of Columbia	1	3	1	1	22	18	1	1
Virginia [1]	9				224		0	
West Virginia	3	2	3	16	110	335	1	2
North Carolina [3]	12	11	10	5	419	614	0	2
South Carolina [3]	7	6	98	243	278	173	0	0
Georgia [3]	4	10		33	352	68	1	2
Florida	2	5	1	1	28	1	0	0
East South Central States:								
Kentucky	1	4	9	18	32	27	1	0
Tennessee	3	11	15	27	48	5	2	1
Alabama [3]	12	12	3	45	34	16	2	0
Mississippi	10	3					0	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 10, 1933, and June 11, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended June 10, 1933	Week ended June 11, 1932	Week ended June 10, 1933	Week ended June 11, 1932	Week ended June 10, 1933	Week ended Jnue 11, 1932	Week ended June 10, 1933	Week ended June 11, 1932
West South Central States:								
Arkansas	3	1	1		83		0	0
Louisiana [3]	8	23	10	4	22	3	0	0
Oklahoma [3]	5	10	8	7	73	135	0	0
Texas [3]	45	18	144	25	550	76	4	0
Mountain States:								
Montana [1]	1	1	1		18	110	0	0
Idaho [1]		1	2	1	6	3	0	0
Wyoming [1]					9	70	0	0
Colorado	2	14			6	60	0	1
New Mexico	6	4			14	25	0	0
Arizona	1	3		1	77	7	0	1
Utah [4]	1				49	1	0	1
Pacific States:								
Washington	3	16				254	0	1
Oregon [1]	1	2	26	9	41	151	0	1
California [1]	29	61	26	42	1,274	452	5	2
Total	449	648	421	537	11,433	17,173	48	52

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended June 10, 1933	Week ended June 11, 1932	Week ended June 10, 1933	Week ended June 11, 1932	Week ended June 10, 1933	Week ended June 11, 1932	Week ended June 10, 1933	Week ended June 11, 1932
New England States:								
Maine	0	0	10	35	0	0	4	1
New Hampshire	0	0	13	7	0	0	0	0
Vermont	0	0	6	8	0	2	0	0
Massachusetts	1	0	255	352	0	0	4	4
Rhode Island	0	0	24	53	0	0	0	0
Connecticut	0	0	62	77	0	0	1	0
Middle Atlantic States:								
New York [1]	0	2	485	922	0	1	20	17
New Jersey	0	0	133	209	0	0	5	2
Pennsylvania	2	1	458	472	0	0	25	10
East North Central States:								
Ohio	1	2	448	331	0	8	9	11
Indiana	1	0	45	62	1	12	7	10
Illinois	1	3	288	255	7	7	10	16
Michigan	3	3	361	356	0	9	4	8
Wisconsin	0	0	86	76	16	0	1	1
West North Central States:								
Minnesota	1	0	42	53	0	5	0	1
Iowa	0	0	15	33	14	22	4	1
Missouri	0	0	31	21	0	1	5	1
North Dakota	0	0	7	6	0	3	0	0
South Dakota	0	0	3	3	0	0	0	0
Nebraska	1	1	12	9	1	8	0	0
Kansas	0	0	26	16	0	6	5	5
South Atlantic States:								
Delaware	0	0	5	4	0	0	0	1
Maryland [1 3 4]	0	0	58	59	0	0	9	18
District of Columbia	0	1	8	12	0	0	1	2
Virginia [1]	0		27		0		9	
West Virginia	0	0	18	11	2	1	4	5
North Carolina [3]	0	2	28	29	1	5	12	17
South Carolina [3]	0	0	6	0	0	0	30	30
Georgia [3]	0	0	4	6	0	0	36	21
Florida	0	0	1	1	0	0	3	5
East South Central States:								
Kentucky	0	1	9	49	0	6	13	26
Tennessee	1	1	16	16	1	3	14	40
Alabama [3]	0	0	17	9	0	7	16	18
Mississippi	1	0	4	3	0	5	8	36

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 10, 1933, and June 11, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended June 10, 1933	Week ended June 11, 1932	Week ended June 10, 1933	Week ended June 11, 1932	Week ended June 10, 1933	Week ended June 11, 1932	Week ended June 10, 1933	Week ended June 11, 1932
West South Central States:								
Arkansas	0	1	0	1	8	2	9	7
Louisiana [3]	0	0	5	6	0	4	29	21
Oklahoma [5]	0	0	7	18	3	15	12	10
Texas [3]	0	6	45	17	7	22	36	10
Mountain States:								
Montana [1]	0	0	17	8	0	7	0	3
Idaho [1]	0	0	3	0	1	0	0	0
Wyoming [1]	0	0	6	4	0	0	1	0
Colorado	0	0	23	25	6	3	1	2
New Mexico	0	0	1	2	0	0	2	1
Arizona	0	0	9	5	0	0	1	3
Utah [4]	0	0	6	7	0	0	0	2
Pacific States:								
Washington	1	2	27	11	13	14	2	13
Oregon [1]	0	1	19	3	16	2	3	3
California [1]	2	1	125	141	17	12	7	10
	16	28	3,304	3,803	114	192	302	392

[1] Rocky Mountain spotted fever, week ended June 10, 1933, 38 cases: 1 case in New York, 8 cases in Maryland, 2 cases in Virginia, 6 cases in Montana, 7 cases in Idaho, 11 cases in Wyoming, 2 cases in Oregon, and 1 case in California.
[2] New York City only.
[3] Typhus fever, week ended June 10, 1933, 41 cases: 1 case in Maryland, 2 cases in North Carolina, 2 cases in South Carolina, 13 cases in Georgia, 10 cases in Alabama, 1 case in Louisiana, and 12 cases in Texas.
[4] Week ended Friday.
[5] Figures for 1933 are exclusive of Oklahoma City and Tulsa, and for 1932 are exclusive of Tulsa only.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
April 1933										
Hawaii Territory	2	9	8		10		0	1	0	7
South Carolina		96	1,703	676	1,337	300	5	23	6	26
May 1933										
Maine	2	5	75		15		2	83	0	6
Massachusetts	5	92		1	2,467		5	1,522	0	15
New York	22	207		3	12,097		5	3,055	3	39
Pennsylvania	12	202			6,097		6	3,426	0	37
Tennessee	9	19	110	94	391	42	2	150	6	25
Vermont		14			115		1	51	0	0

April 1933

	Cases
Chicken pox:	
Hawaii Territory	125
South Carolina	129
Conjunctivitis, follicular:	
Hawaii Territory	11
Conjunctivitis, epidemic:	
Hawaii Territory	4
Dengue:	
South Carolina	7
Diarrhea:	
South Carolina	570
Hookworm disease:	
Hawaii Territory	64
South Carolina	250
Impetigo contagiosa:	
Hawaii Territory	9
Leprosy:	
Hawaii Territory	7
Lethargic encephalitis:	
South Carolina	2
Mumps:	
Hawaii Territory	37
South Carolina	128
Ophthalmia neonatorum:	
South Carolina	34
Paratyphoid fever:	
Hawaii Territory	2
South Carolina	3
Rabies in animals:	
South Carolina	18

	Cases
Tetanus:	
South Carolina	3
Trachoma:	
Hawaii Territory	3
South Carolina	1
Typhus fever.	
South Carolina	1
Whooping cough:	
Hawaii Territory	342
South Carolina	255
May 1933	
Anthrax:	
Massachusetts	1
Chicken pox:	
Maine	143
Massachusetts	1,090
New York	3,291
Pennsylvania	3,849
Tennessee	135
Vermont	89
Dysentery:	
Massachusetts	1
New York	7
Pennsylvania	1
Tennessee	15
German measles:	
Maine	65
Massachusetts	107
New York	214
Pennsylvania	111
Tennessee	150
Impetigo contagiosa:	
Tennessee	1
Lead poisoning:	
Massachusetts	3
Pennsylvania	1
Lethargic encephalitis:	
Massachusetts	3
New York	7
Pennsylvania	9
Mumps:	
Maine	59
Massachusetts	779
Pennsylvania	1,654
Tennessee	78
Vermont	147
Ophthalmia neonatorum:	
Massachusetts	105
New York	1
Pennsylvania	1
Tennessee	2
Paratyphoid fever:	
Maine	2
Massachusetts	2
New York	1
Tennessee	2
Puerperal septicemia:	
Pennsylvania	10
Rabies in animals.	
Maine	11
New York [1]	1
Scabies:	
Tennessee	13
Septic sore throat:	
Maine	3
Massachusetts	18
Septic sore throat—Con.	
New York	20
Tennessee	4
Tetanus:	
Massachusetts	1
New York	5
Tennessee	1
Trachoma:	
Massachusetts	1
Tennessee	19
Trichinosis	
New York	10
Tularaemia:	
Tennessee	1
Typhus fever:	
New York	1
Undulant fever:	
Maine	6
Massachusetts	1
New York	25
Pennsylvania	8
Vermont	2
Vincent's angina:	
Maine	5
New York [1]	100
Tennessee	8
Whooping cough:	
Maine	61
Massachusetts	710
New York	1,991
Pennsylvania	1,026
Tennessee	304
Vermont	56

[1] Exclusive of New York City.

WEEKLY REPORTS FROM CITIES

City reports for week ended June 3, 1933

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	0		0	4	2	1	0	0	0	2	25
New Hampshire:											
Concord	0		0	0	1	2	0	0	0	0	9
Manchester	0		0	0	0	0	0	1	0	0	25
Nashua	0		0	0	0	0	0	0	0	0	
Vermont:											
Barre	0		1	0	0	0	0	1	0	2	5
Burlington	1		0	0	0	0	0	0	0	0	8
Massachusetts:											
Boston	11		1	201	10	63	0	7	1	40	101
Fall River											
Springfield	0		0	0	1	6	0	0	0	1	25
Worcester	0		0	77	4	18	0	0	0	1	33
Rhode Island:											
Pawtucket	0		0	0	0	3	0	0	0	0	11
Providence	1		0	0	1	18	0	4	0	10	56
Connecticut:											
Bridgeport	0		0	28	2	11	0	0	1	5	22
Hartford	0		0	4	4	6	0	0	0	3	43
New Haven	0		0	8	2	2	0	1	0	28	49
New York:											
Buffalo	1		0	54	14	42	0	5	0	27	122
New York	20	10	6	1,022	126	131	0	101	1	106	1,374
Rochester	0		0	3	5	12	0	2	0	1	67
Syracuse	0		0	3	6	6	0	1	0	3	41

City reports for week ended June 3, 1933—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
New Jersey:											
Camden	1		0	16	1	9	0	0	0	0	25
Newark	1	2	0	113	6	9	0	3	0	42	80
Trenton	0		0	21	0	3	0	0	1	7	28
Pennsylvania:											
Philadelphia	3	1	1	459	20	63	0	32	1	12	427
Pittsburgh	6	1	0	5	12	58	0	5	0	51	130
Reading	1		0	8	2	3	0	0	0	2	27
Scranton	0			2		7	0		0	0	
Ohio:											
Cincinnati	2		1	6	0	21	0	6	0	1	92
Cleveland	9	25	0	4	7	104	0	9	1	39	140
Columbus	2	1	1	10	4	31	0	3	0	0	66
Toledo	3		0	146	6	100	0	4	1	9	76
Indiana:											
Fort Wayne	7		0	0	0	5	0	4	1	1	18
Indianapolis	0		0	127	5	7	0	1	0	4	
South Bend	0		0	0	2	0	0	0	0	0	17
Terre Haute	0		0	26	1	6	0	1	0	0	14
Illinois:											
Chicago	5		2	368	28	223	0	54	1	18	501
Cicero	0			1		3	0		0	0	
Springfield	2		0	0	0	2	0	0	1	0	17
Michigan:											
Detroit	16		1	184	10	60	0	16	0	82	226
Flint	1	13	0	1	4	6	0	1	1	3	26
Grand Rapids	0		0	6	0	6	0	0	0	8	28
Wisconsin:											
Kenosha	0		0	2	0	2	0	0	0	23	5
Madison	[1] 2			47		2	0		0	4	
Milwaukee	0	1	1	5	5	26	0	4	1	66	88
Racine	1		0	1	0	12	0	0	0	16	8
Superior	0		0	0	2	0	0	0	0	9	8
Minnesota:											
Duluth	0		1	15	2	0	0	2	0	34	24
Minneapolis	1		0	29	2	34	0	1	0	37	109
St. Paul	1	1	1	86	4	19	0	2	0	59	50
Iowa:											
Des Moines	2			0		3	2		0	0	23
Sioux City	0			0		1	0		0	1	
Waterloo	0			0		1	2		0	0	
Missouri:											
Kansas City	1		0	17	11	24	0	4	1	3	85
St. Joseph	1		0	15	2	1	0	2	0	0	14
St. Louis											
North Dakota:											
Fargo	0		0	0	1	0	0	0	0	0	4
Grand Forks	0		0	0	0	0	0	0	0	0	
South Dakota:											
Aberdeen	0		0	0	0	0	0	0	0	0	
Nebraska:											
Omaha	2		0	73	2	2	0	1	0	6	35
Kansas:											
Topeka	0		0	52	2	0	0	0	0	0	13
Wichita	1		0	0	1	2	0	1	0	5	27
Delaware:											
Wilmington	0		0	11	2	2	0	0	0	2	22
Maryland:											
Baltimore	3	2	0	4	11	63	0	15	1	43	207
Cumberland	0		0	2	1	1	0	0	0	0	6
Frederick	0		0	0	0	0	0	0	0	12	1
District of Columbia:											
Washington	2	1	1	19	5	10	0	4	0	4	118
Virginia:											
Lynchburg	0		0	17	1	0	0	1	0	36	7
Norfolk	0		0	40	2	3	0	1	0	3	
Richmond	1		0	2	3	0	0	1	2	6	49
Roanoke	0		0	6	0	1	0	0	0	2	13
West Virginia:											
Charleston	1	3	0	0	1	0	0	0	0	6	17
Huntington	0		0	0	0	3	0	0	0	1	
Wheeling	0		0	73	0	2	0	2	0	3	10

[1] Nonresident.

City reports for week ended June 3, 1933—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths all causes
North Carolina:											
Raleigh	0		0	0	2	0	0	1	0	1	19
Wilmington	0		0	11	1	0	0	1	0	5	10
Winston-Salem											
South Carolina:											
Charleston	1	8	0	0	1	0	0	2	0	3	18
Columbia											
Greenville	0		0	3	1	0	0	0	1	1	10
Georgia:											
Atlanta	1	6	1	14	0	0	0	5	3	39	73
Brunswick	0		0	0	0	0	0	0	1	0	5
Savannah	0	6	0	1	0	0	0	2	2	1	23
Florida:											
Miami	2	1	0	0	0	0	0	1	0	3	16
Tampa	0	1	1	0	1	0	0	1	0	2	24
Kentucky:											
Ashland	0		0	1	0	1	0	0	0	1	
Lexington	0		0	4	0	0	0	1	0	4	14
Louisville	0		0	12	5	9	0	1	0	7	64
Tennessee:											
Memphis	0		1	124	8	2	1	6	0	26	78
Nashville	1		0	7	0	2	0	4	0	0	38
Alabama:											
Birmingham	2		2	0	1	2	0	0	2	3	35
Mobile	2		0	1	0	0	0	0	0	0	22
Montgomery	1	1		1		0	0		0	3	
Arkansas:											
Fort Smith	0			0		0	0		0	0	
Little Rock	0		0	75	1	0	0	3	5	0	
Louisiana:											
New Orleans	3	1	2	4	7	1	0	12	0	4	119
Shreveport	0		0	2	3	1	0	1	0	3	30
Oklahoma:											
Tulsa	0			36		0	5		0	15	
Texas:											
Dallas	3	1	1	36	1	4	0	3	1	0	49
Fort Worth	0		0	0	3	2	0	4	0	2	33
Galveston	0		0	1	2	2	0	0	0	0	19
Houston	3		0	0	2	1	0	4	1	0	56
San Antonio	2		1	9	6	1	0	8	0	1	61
Montana:											
Billings	0		0	0	0	0	0	0	0	0	6
Great Falls	0		0	0	1	0	0	0	1	1	12
Helena	0		0	0	0	0	0	0	0	0	5
Missoula	0		0	0	1	1	0	0	0	0	7
Idaho:											
Boise											
Colorado:											
Denver	0	23	1	1	5	9	0	8	0	6	76
Pueblo	0		0	0	0	2	0	0	0	2	6
New Mexico:											
Albuquerque	0		0	0	0	2	0	8	1	9	12
Utah:											
Salt Lake City	0		0	29	1	4	0	0	0	11	28
Nevada:											
Reno	0		0	0	0	0	0	0	0	0	1
Washington:											
Seattle	0			2		23	0		0	5	
Spokane	0			0		1	0		0	0	
Tacoma	0		0	0	0	1	0	0	0	0	28
Oregon:											
Portland	1		1	1	3	10	2	2	1	0	68
Salem	0		0	3	0	1	0	0	0	0	
California:											
Los Angeles	20	11	1	348	5	48	18	24	2	55	265
Sacramento	0	1	1	2	1	0	0	6	0	39	28
San Francisco	4	2	0	2	11	5	0	10	0	33	142

City reports for week ended June 3, 1933—Continued

State and city	Meningococcus meningitis		Polio-myelitis cases	State and city	Meningococcus meningitis		Polio-myelitis cases
	Cases	Deaths			Cases	Deaths	
New York:				Minnesota:			
New York	3	1	1	Minneapolis	1	0	0
Rochester	0	0	1	Nebraska:			
Pennsylvania:				Omaha	1	0	0
Philadelphia	1	0	0				
Pittsburgh	0	0	1	Maryland:			
				Baltimore	1	0	0
Indiana:				District of Columbia:			
Indianapolis	3	0	0	Washington	0	1	0
Illinois:				West Virginia:			
Chicago	19	5	0	Charleston	1	1	0
Michigan:							
Detroit	1	0	2	Tennessee:			
Flint	0	0	1	Memphis	1	0	0
Wisconsin:							
Madison	0	0	1	Oregon:			
				Portland	1	0	0

Lethargic encephalitis.—Cases: Pittsburgh, 1; Baltimore, 1.
Pellagra.—Cases: Charleston, S.C., 3; Savannah, 2; Mobile, 1; New Orleans, 2; Dallas, 1.
Typhus fever.—Cases: New York, 1; Charleston, S.C., 2; Savannah, 1.

FOREIGN AND INSULAR

CANADA

Ontario Province—Communicable diseases—5 weeks ended April 29, 1933.—The Department of Health of the Province of Ontario, Canada, reports certain communicable diseases for the 5 weeks ended April 29, 1933, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	6	7	Pneumonia		146
Chicken pox	1,296		Poliomyelitis	1	
Diphtheria	59	1	Puerperal septicemia		1
Dysentery	1	1	Scarlet fever	384	2
Erysipelas	23		Septic sore throat	14	2
German measles	76		Smallpox	3	
Gonorrhea	205		Syphilis	255	
Influenza	32	9	Tuberculosis	212	51
Lethargic encephalitis	1	1	Typhoid fever	30	
Measles	945	6	Undulant fever	21	
Mumps	1,116		Whooping cough	480	7
Paratyphoid fever	9				

GREAT BRITAIN

Scotland—Vital statistics—Quarter ended March 31, 1933.—The Registrar General of Scotland has published the following statistics for the first quarter of the year 1933:

Population (estimated)	4,916,000
Births	21,787
Birth rate per 1,000 population	18.0
Deaths	20,750
Death rate per 1,000 population	17.1
Marriages	7,054
Deaths under 1 year	2,358
Deaths under 1 year per 1,000 births	108
Deaths from—	
Bronchitis	1,595
Broncho-pneumonia	1,998
Cancer	1,804
Cerebrospinal fever	95
Diabetes	212
Diphtheria	89
Dysentery	2
Erysipelas	54
Heart disease	3,155
Deaths from—Continued	
Influenza	1,689
Lethargic encephalitis	38
Measles	17
Nephritis, acute	52
Nephritis, chronic	314
Nephritis, unspecified	122
Paratyphoid fever	1
Pneumonia, lobar	425
Pneumonia	280
Poliomyelitis	3
Puerperal sepsis	51
Scarlet fever	85
Syphilis	21
Tetanus	4
Tuberculosis	1,173
Typhoid fever	3
Whooping cough	356

ITALY

Communicable diseases—4 weeks ended February 5, 1933.—During the 4 weeks ended February 5, 1933, cases of certain communicable diseases were reported in Italy as follows:

Disease	Jan 9-15		Jan 16-22		Jan 23-29		Jan. 30-Feb. 5	
	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected
Anthrax	13	12	12	12	16	13	14	14
Cerebrospinal meningitis	13	11	10	9	7	7	7	7
Chicken pox	300	126	289	127	284	102	290	104
Diphtheria and croup	718	356	794	393	696	353	592	321
Dysentery	4	4	6	5	5	5	4	4
Lethargic encephalitis	2	2	3	3	3	3	4	4
Measles	1,436	226	1,555	253	1,282	226	1,367	212
Poliomyelitis	5	4	12	11	3	2	4	4
Scarlet fever	452	148	439	159	487	161	407	149
Smallpox	2	1						
Typhoid fever	403	235	357	220	296	171	228	154

MEXICO

Tampico—Communicable diseases—May 1933.—During the month of May 1933 certain communicable diseases were reported in Tampico, Mexico, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	1	1	Paratyphoid fever	2	1
Enteritis, various		37	Tuberculosis		31
Influenza	38		Typhoid fever	1	1
Measles	1		Whooping cough	22	2
Malaria	278	9			

PUERTO RICO

Communicable diseases—4 weeks ended March 25, 1933.—During the 4 weeks ended March 25, 1933, cases of certain communicable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chicken pox	116	Ophthalmia neonatorum	9
Colibacillosis	1	Pellagra	6
Diphtheria	43	Puerperal fever	3
Dysentery	630	Syphilis	7
Erysipelas	5	Tetanus	4
Filariasis	3	Tetanus, infantile	8
Framboesia	1	Trachoma	14
Influenza	146	Tuberculosis	403
Malaria	2,217	Typhoid fever	11
Measles	251	Whooping cough	96
Mumps	29		

SWITZERLAND

Vital statistics—Years 1931 and 1932—Correction.—On page 675 of the PUBLIC HEALTH REPORTS for June 9, 1933, an error appears in the table reporting vital statistics in Switzerland. The figures in the last two columns of the table should each be moved down one line, making the figures for influenza, 1,855 and 1,924, etc.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

(NOTE —A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for May 26, 1933, pp 586–596. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued June 30, 1933, and thereafter, at least for the time being, in the issue published on the last Friday of each month)

Cholera

Philippine Islands.—During the week ended June 10, 1933, cholera was reported in the Philippine Islands as follows: Province of Bohol, 14 cases, 9 deaths; Province of Leyte, 2 cases, 2 deaths.

Plague

Argentina.—During the month of May 1933, 8 cases of plague with 4 deaths were reported at Serrezuela, Cordoba Province, Argentina.

Smallpox

Guatemala.—During April 1933, three cases of smallpox were reported in Guatemala.

British Honduras.—Under date of June 13, 1933, a case of smallpox (alastrim) was reported at Belize, British Honduras.

Typhus Fever

Guatemala.—During April 1933, 14 cases of typhus fever with 2 deaths were reported in Guatemala.

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UNITED STATES TREASURY DEPARTMENT

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UNITED STATES PUBLIC HEALTH SERVICE

HUGH S. CUMMING, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

Asst. Surg. Gen. R. C. WILLIAMS, *Chief of Division*

The PUBLIC HEALTH REPORTS are issued weekly by the United States Public Health Service through its Division of Sanitary Reports and Statistics, pursuant to acts of Congress approved February 15, 1893, and August 14, 1912.

They contain: (1) Current information of the prevalence and geographic distribution of preventable diseases in the United States insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other communicable diseases throughout the world. (2) Articles relating to the cause, prevention, or control of disease. (3) Other pertinent information regarding sanitation and the conservation of public health.

The PUBLIC HEALTH REPORTS are intended primarily for distribution to health officers, members of boards or departments of health, and those directly or indirectly engaged in or connected with public health or sanitary work. Articles of general or special interest are issued as reprints from the PUBLIC HEALTH REPORTS or as supplements, and in these forms are available for general distribution to those desiring them.

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CONTENTS

PUBLIC HEALTH REPORTS

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THE PATHOLOGY OF PSITTACOSIS

A recent publication[1] issued by the United States Public Health Service gives a description of the pathology of psittacosis and the distribution of *Rickettsia psittaci* in the tissues of man and animals.

The history of the pathology of psittacosis begins with three autopsies by Eberth in an outbreak reported by Ritter in 1879. Since that time reports of 44 additional autopsies have been published and Lillie has been able to secure material from five more, making a total of 50-odd autopsies. From these, and more specially from 4 published and 5 unpublished cases which Lillie himself has had the opportunity to study, an attempt has been made to write a unified account of the pathologic anatomy and histology of psittacosis. The human cases, both published and unpublished, on which this report is based are tabulated according to the date of publication.

In the second paper the author describes the pathology of the disease in animals and the distribution of *Rickettsia psittaci* in the tissues of both man and animals. It would seem indicated that *R. psittaci* is primarily an epithelial parasite. An etiological relationship of *R. psittaci* to psittacosis also seems indicated, though not proved. Lillie notes that, subsequent to his observations, the work of Bedson on the isolation, by centrifugation, of the inclusion bodies of psittacosis has appeared. These findings further support the idea of an etiological relationship of *R. psittaci* to psittacosis.

The author appends an extensive bibliography and several plates of photomicrographs to each paper.

[1] I. The pathology of psittacosis in man, and II. The pathology of psittacosis in animals and the distribution of *Rickettsia psittaci* in the tissues of man and animals. By R. D. Lillie, Surgeon, United States Public Health Service. National Institute of Health Bulletin No. 161. May 1933. Illus. 66 pages.

THE PELLAGRA-PREVENTIVE VALUE OF GREEN CABBAGE, COLLARDS, MUSTARD GREENS, AND KALE

By G. A. Wheeler, *Surgeon*, and D. J. Hunt, *Assistant Surgeon, United States Public Health Service*

The studies here reported were conducted at the Milledgeville State Hospital, Milledgeville, Ga., and represent a continuation of the program of experiments designed to determine the relative pellagra-preventive potency of the common foods, and foodstuffs. As in much of the recent work on this subject, attention has been centered on fresh vegetables, especially those which may be more readily and cheaply grown in the Cotton Belt and made available during the spring months when variety in diet, under the conditions which prevail in this section, is normally most restricted.

Previous studies have included tomatoes, carrots, and rutabaga turnips (1); turnip greens, spinach, green beans, and mature onions (2); and green English peas (3). The present report covers green cabbage, collards, mustard greens, and kale.

It has, for the most part, continued to be necessary to employ the canned product in testing these green vegetables, for the reason that under ordinary conditions they are not available in the fresh state for a sufficient length of time to permit of an adequate feeding experiment. In view of the fact that the pellagra-preventive factor is not appreciably affected by the heat incident to canning, this procedure seems to be a safe one.

As in previous tests of the pellagra-preventive power of individual foods, each item was used as a supplement to a basic diet believed to be physiologically complete except for a deficiency of the pellagra-preventive factor. When used alone this diet leads to the production of pellagra in any given number of individuals within about 3 to 6 months (4). A notable prolongation of this period in a considerable number of a group of individuals must therefore be looked upon as being brought about by the preventive influence of the particular dietary supplement employed.

In keeping with the previous work, each experimental feeding has been continued for a period of 1 year unless sooner terminated by the development of a sufficient number of cases of pellagra.

GREEN CABBAGE

Mississippi-grown, canned, unheaded cabbage was used. The daily allowance was 482 grams, including the can liquor. The approximate composition of the cabbage-supplemented diet is shown in table 1.

Of 15 colored females who came under observation on the cabbage-supplemented ration, 1 developed pellagra during the seventh month, while the remaining 14 completed the test period of 1 year without presenting symptoms. Inasmuch as all of this group would have developed pellagra within about 6 months had not the cabbage supplement been employed, it is to be concluded that the canned green cabbage contains the pellagra-preventive factor; but since one of the group developed pellagra while taking this supplemented diet, it cannot be said to protect completely even in the generous quantity in which it was used. Nevertheless, in view of its adaptability, cheapness of production, and seasonal availability, green cabbage may be considered a very practicable contributory source of pellagra prevention.

TABLE 1.—*Basic diet plus canned green cabbage*

[Total calories, 1,997]

Article of diet	Quantity	Nutrients		
		Protein	Fat	Carbohydrate
Basic	*Grams*	*Grams*	*Grams*	*Grams*
Corn meal	270	22 7	12 7	199 8
Cowpeas (California black-eyed)	42	8 98	6	25 5
Flour	21	2 4	2	15 8
Lard	42		42 0	
Baker's bread	56	5 2	6	29.5
Tomato juice (canned)	127			
Cod-liver oil	14		14 0	
Calcium carbonate	3			
Sirup iodide of iron	2 drops			
Dilute hydrochloric acid (U S P)	90 drops			
Supplemental				
Cabbage (canned green)	482	2 6	96	26 9
Total nutrients		41 88	71 06	297.5

COLLARDS

A commercial brand of canned collards was used. The daily allowance was 482 grams, including the can liquor. The approximate composition of the collards-supplemented diet is shown in table 2.

A group of 16 colored females came under observation on the collards-supplemented ration, 13 of whom were continued on it for 1 year. In none was evidence of pellagra observed. Canned collards, in the quantity used, must therefore be regarded as a suitable supplement for an otherwise pellagra producing diet.

This vegetable has the further advantage of being easily grown and widely adaptable throughout most of the South. Under ordinary conditions it survives the winter weather and is at its best during late winter and early spring when other supplements are scarcest. Taken all in all, it is a highly practicable source for supplementing the average pellagrous dietary, and its production and use should become more general.

TABLE 2.—*Basic diet plus canned collards*

[Total calories, 1,98[illegible]]

Article of diet	Quantity	Nutrients		
		Protein	Fat	Carbohydrate
Basic	*Grams*	*Grams*	*Grams*	*Grams*
Corn meal	270	22 7	12 7	199 8
Cowpeas (California black-eyed)	[illegible]	8 98	.6	25 5
Flour	21	2 4	.2	15 8
Lard	12		42 0	
Baker's bread	56	5 2	.6	29.5
Tomato juice	127			
Cod-liver oil	11		14 0	
Calcium carbonate	3			
Dilute hydrochloric acid (U S P.)	90 drops			
Sirup iodide of iron	2 drops			
Supplemental				
Collards (canned)	482	5 78	67	22 1
Total nutrients		45 06	70.77	292.7

MUSTARD GREENS

Mississippi-grown canned mustard greens were used, except for a period of 5 weeks during which locally grown fresh mustard greens (in equivalent quantity) were used. The daily allowance was 533 grams, including the can liquor. The approximate composition of the mustard greens-supplemented diet is shown in table 3.

Of 14 white females who came under observation on the mustard greens-supplemented ration, 1 developed pellagra during the latter part of the sixth month. The remaining 13 completed the test period of 1 year without manifesting symptoms. It must therefore be concluded that the mustard greens used contained the pellagra-preventive factor. But since a rather generous allowance did not bring about complete protection, this vegetable cannot be regarded as a particularly rich source of it. It does, however, have the advantage of being easily and quickly grown in the South and made available in the early spring. It should therefore be classed as a valuable adjunct for building up an otherwise pellagra-producing diet.

TABLE 3.—*Basic diet plus canned mustard greens*

[Total calories, 1,878]

Article of diet	Quantity	Nutrients		
		Protein	Fat	Carbohydrate
Basic	*Grams*	*Grams*	*Grams*	*Grams*
Corn meal	270	22 7	12.7	199.8
Cowpeas (California black-eyed)	42	8 98	.6	25 5
Flour	21	2 4	.2	15.8
Lard	42		42.0	
Tomato juice	127			
Cod-liver oil	14		14.0	
Calcium carbonate	3			
Sirup iodide of iron	2 drops			
Dilute hydrochloric acid, U.S.P.	90 drops			
Supplemental				
Mustard greens (canned)	533	13.6	1.3	21.3
Total nutrients		47.68	70.8	262.4

KALE

Mississippi-grown canned green Scotch kale was used. The daily allowance was 534 grams, including the can liquor. The approximate composition of the kale-supplemented diet is shown in table 4.

A group of 14 white females came under observation on this ration for a period of 1 year. At no time was evidence of pellagra observed. Canned kale therefore contains the pellagra-preventive factor and, in the quantity used, is an efficient supplement for an otherwise pellagra-producing diet.

Some members of this group showed a slight and persistent yellowish tint over the bony prominences poorly supplied with subcutaneous fat. Presumably this was the result of excess carotin supplied by the green kale.

TABLE 4.—*Basic diet plus canned green Scotch kale*

(Total calories, 1,899)

Article of diet	Quantity	Nutrients		
		Protein	Fat	Carbohydrate
Basic	*Grams*	*Grams*	*Grams*	*Grams*
Corn meal	270	22.7	12.7	199.8
Cowpeas (Calif. black-eyed)	42	8.98	.6	25.5
Flour	21	2.4	2	15.8
Lard	42		42.0	
Tomato juice	127			
Cod-liver oil	14		14.0	
Calcium carbonate	3			
Sirup iodide of iron	2 drops			
Dilute hydrochloric acid, U.S.P.	90 drops			
Supplemental				
Kale (canned green, Scotch)	534	13.4	2.7	23.7
Total nutrients		47.48	72.2	264.8

CONCLUSIONS

1. Canned green cabbage and canned mustard greens contain the pellagra-preventive factor and, though not fully adequate in themselves, may be regarded as quite practicable contributory sources for supplementing otherwise pellagra-producing diets.

2. Canned collards and canned kale are satisfactory pellagra-preventive supplements, at least when used in relatively large proportion.

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(3) Wheeler, G. A.: The Pellagra-Preventive Value of Autoclaved Dried Yeast, Canned Flaked Haddock, and Canned Green Peas. Pub. Health Rep., vol. 48, pp. 67-75, Jan. 20, 1933.
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THE RELATION BETWEEN THE TRYPANOCIDAL AND SPIROCHETICIDAL ACTIVITIES OF NEOARSPHENAMINE

IV. THE SPIROCHETICIDAL ACTIVITY AS MEASURED BY THE STERILIZING EFFICIENCY OF NEOARSPHENAMINE

By T. F. Probey, *Assistant Pharmacologist, United States Public Health Service*

In previous reports on the relation between the trypanocidal and spirocheticidal activity of neoarsphenamine, the spirocheticidal activity of the two brands of this arsenical have been appraised on the basis of the therapeutic dose (1) (minimal dose which caused rapid disappearance of the spirochetes from the primary lesions and healing of the lesion without relapse) and the prophylactic dose (2) (minimal dose which protects the rabbit against the development of experimental syphilis when treated with one prophylactic dose two days after inoculation).

It is believed that the final evaluation of the spirocheticidal activity of the antisyphilitic drugs must be ascertained by the sterilizing or curative action in experimental syphilis in rabbits. It was, therefore, deemed necessary to include the sterilizing activity of neoarsphenamine in order that a more complete study of the spirocheticidal activity might be offered for comparison with the trypanocidal activity value.

In a comprehensive study of the sterilizing efficiency of the arsphenamines, Voegtlin and Dyer (3) reported the minimal sterilizing dose of neoarsphenamine, one treatment at an advanced stage of the disease, to be 40 mg per kilogram. The efficiency of arsphenamine, neoarsphenamine, and sulpharsphenamine was reported to be identical in terms of the absolute amount of arsenic and the percentage of sterilizing efficiency increase with an increase in the dose. In the case of neoarsphenamine these authors reported 50 percent sterilization of 6 rabbits at 16 mg, 40 percent sterilization of 5 rabbits at 24 mg, and 100 percent sterilization of 6 rabbits at 40 mg per kilogram.

Kolmer (4), in his book Chemotherapy (1926), discussing the comparison of the trypanocidal and spirocheticidal properties of arsphenamine and neoarsphenamine, recorded that the comparison in the results of these tests is not definite or constant but only broad

and general. The therapeutic efficiency of six neoarsphenamines from the same laboratory was reported by these two methods. The minimal effective dose as obtained by the trypanocidal test varied from 2 to 10 mg, whereas the spirocheticidal efficiency varied from 8 to 12 mg per kilogram. Two products are of interest: Neoarsphenamine E and F of the Kolmer study reported the same spirocheticidal activity, 12 mg, but the trypanocidal effectiveness varied from 2 mg for neoarsphenamine E to 10 mg for neoarsphenamine F.

The trypanocidal tests, Kolmer reported, "have proven of distinct value in evaluating the properties of different lots of arsphenamine and neoarsphenamine for the treatment of human syphilis."

Schamberg and Kolmer, with Madden (1933), (5), reported on the comparison of the trypanocidal and spirocheticidal activity of 18 neoarsphenamines from seven different manufacturers. It was their suggestion that the trypanocidal and the spirocheticidal activity tests be established as standard control tests for neoarsphenamine.

The authors stated that the relationship between the trypanocidal activity and its curative activity in syphilis is broad and general. This observation, it is believed, is borne out by the experimental evidence. In 12 products that satisfied the requirements of both tests the trypanocidal activity is recorded as varying from 4 mg to 12 mg per kilo, whereas the minimal effective dose in experimental syphilis for all of these 12 products was 20 mg per kilogram.

In but two products of the six which failed to satisfy the requirements of one or both tests do the results support their observation that neoarsphenamine much below the average in trypanocidal activity will be below the average in spirocheticidal or curative activity for syphilis. In the remaining four products this observation does not appear to be supported. It is recorded that two of these failed the trypanocidal test, but satisfied the requirements of the spirocheticidal tests while the other two were efficient when tested for trypanocidal activity, but ineffective in the spirocheticidal activity test.

It is believed that the results reported by Schamberg and Kolmer, with Madden, on the comparison of the efficiency of these tests are not constant and definite but only broad and general as stated by Kolmer in 1926.

The spirocheticidal tests reported all of 18 products ineffective at 15 mg per kilo and 14 effective at 20 mg per kilo; higher dosage was not included. Since the spirocheticidal activity for the four preparations was not found by these authors, it could not be stated how ineffective these products are, or that they are not within a reasonable experimental variation.

The trypanocidal and the spirocheticidal activities of the neoarsphenamines used in this investigation have been previously reported (1) (2) under designation of brand E and brand F. The former represented the most effective and the latter the least effective in trypanocidal activity. These products were found to have no noteworthy difference in their spirocheticidal activity as indicated by the results of the therapeutic and the prophylactic dose treatment.

EXPERIMENTAL

The technique of infecting the rabbits was the same as that described in previous reports on the spirocheticidal activity of neoarsphenamine. Periodic examinations were made to follow the development of the primary lesions before treatment. Only animals which developed a dark field, positive, typical primary lesion were used.

Treatment consisted of one intravenous injection of the dose and brand of neoarsphenamine as shown in table 1. The control group received no treatment. For convenience the observation is divided into pretreatment, post-treatment, and transfer periods. The progress of the disease and the effect of the treatment are recorded by observation of the evolution of the lesion, by dark-field examination, by the quantitative Kahn test, and by the tissue-transfer method.

The evaluation of the sterilizing or curative efficiency of neoarsphenamine was based upon the minimal dose of the drug which cured rabbits with well-developed primary syphilitic lesions. Cure of the infected animals was proved by the tissue-transfer method.

The pretreatment observation period of 2 months allowed the primary lesions to be well developed and the serum to have developed reacting substances as recorded by the quantitative Kahn tests. The post-treatment observation of approximately 3 months allowed sufficient time for the spreading of the infection from organisms surviving the treatment.

Transfers were made from the popliteal lymph nodes and the testicle originally inoculated. Two rabbits were employed for each transfer, the left testicle and scrotum of each being inoculated with the testicular emulsion and the opposite side with the popliteal gland emulsion.

The sterilizing or curative activity of neoarsphenamine E7 and F6 at 30 and 40 mg per kilo on experimental syphilis in rabbits is reported in series 1. The animals were inoculated February 8, 1930, and given one treatment 69 days later. Observations after treatment extended over a period of 14 weeks, after which tissue-transfer tests were made. The observation time of the transfer rabbits was 18

weeks. All animals receiving 40 mg per kilo, 7 on E7 and 5 on F6, reported negative transfers, and of those receiving 30 mg per kilo all of the E7 (5 rabbits) and all but one (6 rabbits) treated with F6 were negative.

The spirocheticidal efficiency of E7 and F7 was tested at 20 mg and 30 mg per kilo in series 2. In this test the sterilizing efficiency of both products might be placed at 30 mg, as all animals receiving this dose were apparently cured of the infection. All of the transfer animals remained negative. Both products were ineffective at 20 mg per kilo. The E7 product sterilized 62.5 percent of 8 animals, and 87.5 percent of 8 animals were cured by the F7 product. The animals were given one treatment (Jan. 5, 1932) 61 days after inoculation and observed over a period of 12 weeks, after which time tissue transfers were made from all surviving animals. The observation time of the transfer animals was 18 weeks.

It was deemed advisable because of the high percentage of sterilization (87.5 percent) of the F7 product at 20 mg per kilo dose to make subtransfers in order that asymptomatic infection would be eliminated in the original transfer animals. Substransfers, therefore, were made from all the surviving original transfers of the F7 product at 20 mg and also from 4 rabbits of the F7 product at 30 mg and 5 rabbits of the E7 at 30 mg dose. In all, there were 19 subtransfers, all of which were negative.

The third series—a test of the efficiency of F7 at 40 mg, F6 at 20 mg, and the E7 at 30 mg per kilo—was for the purpose of completing the dosage program of the other two series to determine the spirocheticidal efficiency, sterilizing or curative activity, by the one dose of neoarsphenamines F6, F7, and E7 at 20, 30, and 40 mg per kilo.

The rabbits were given one treatment, March 29, 1932, 62 days after inoculation and observed for a period of 15 weeks, after which time tissue transfers were made. The transfer rabbits were held for observation during a period of 16 weeks.

The F6 product was not effective at 20 mg per kilo, two rabbits of the six treated producing the infection in their transfers, whereas the F7 at 40 mg (3 rabbits) and the E7 at 30 mg (2 rabbits) failed to produce evidence of the infection on transfer.

It is believed that the results of these tests support the placing of the minimal curative dose of these two brands of neoarsphenamine at 30 mg per kilo. It is granted that the F6 product failed to cure one of six rabbits at this dose; but, on the other hand, the F preparations sterilized a slightly higher percentage of animals at 20 mg than did the E product.

TABLE 1.—*Spirocheticidal activity of neoarsphenamine*

Brand E, of high trypanocidal activity, Brand F, of low trypanocidal activity

Series	Product	40 mg per kg				30 mg per kg				20 mg per kg				Untreated controls		
		Number of rabbits treated	Result of transfer		Percentage sterilization	Number of rabbits treated	Result of transfer		Percentage sterilization	Number of rabbits treated	Result of transfer		Percentage sterilization	Number of rabbits	Result of transfer	
			Negative	Positive			Negative	Positive			Negative	Positive			Negative	Positive
1	E7	7	7	0	100	5	5	0	100	---	---	---	---	7	0	7
	F6	5	5	0	100	6	5	1	83 3	---	---	---	---			
2	E7	---	---	---	---	6	6	0	100	8[1]	5	2	62 5	2	0	2
	F7	---	---	---	---	5	5	0	100	8	7	1	87 5			
3	F7	---	---	---	---	2	2	0	100	---	---	---	---	2	0	2
	F6	---	---	---		---	---	---	---	6	4	2	66 6			
	F7	3	3	0	100	---	---	---	---	---	---	---	---			
Total	E7	7	7	0	100	13	13	0	100	8[1]	5	2	62 5	11	0	11
	F6	5	5	0	100	6	5	1	83 3	6	4	2	66 6			
	F7	3	3	0	100	5	5	0	100 0	8	7	1	87 5			

[1] Metastatic lesion in one rabbit, not transferred.

TABLE 2.—*The trypanocidal and spirocheticidal properties of neoarsphenamine, percent of efficiency*

Product	Trypanocidal test (in rats)				Spirocheticidal test (in rabbits)															
	Dose (mg per kg)			M E D (mg per kg)	Therapeutic dose					Prophylactic dose							Curative dose			
					Dose (mg per kg)				Effective dose (mg per kg)	Dose (mg per kg)						Effective dose (mg per kg)	Dose (mg per kg)			Effective dose (mg per kg)
	35	25	15		15	12 5	10	5		40	30	20	15	10	5		40	30	20	
F5	100	100	40	25	80	---	66	17	15	---	---	---	---	---	---	---	---	---	---	---
F6	100	100	0	25	100	100	---	---	>12 5	100	100	93	66	50	14	20	100	83 3	66 6	80
F7	100	100	60	25	---	---	---	---	---	---	---	---	---	---	---	---	100	100	87.5	30
	Dose (mg per kg)																			
	15	10	7																	
E1	100	0	25	15	100	---	50	17	15	---	---	---	---	---	---	---	---	---	---	---
E7	100	60	0	15	100	100	---	---	>12 5	100	90	92	20	50	20	20	100	100	62. 5	30

The material presented in table 2 contains the trypanocidal and spirocheticidal (therapeutic and prophylactic dose) activities of neoarsphenamine brands E and F, represented by table 3 in the previous report (2), to which has been added the trypanocidal activity of F7 and the spirocheticidal activity, as measured by the sterilizing or curative efficiency, of brand E product 7 and brand F products 6 and 7.

Reversal of the Kahn reaction in four unsuccessfully treated rabbits was as complete as in those animals cured of the infection. These results support the findings of Wakerlin and Horrall (6) that the Kahn reaction is negative in latent experimental syphilis in rabbits. It would, therefore, appear that the Kahn test results cannot be accepted as criteria of the curative efficiency of neoarsphenamine in experimental syphilis in rabbits.

If the results of the 30 mg dose of the prophylactic series are compared with the results of the same dose of the curative series, it would indicate that in experimental syphilis in rabbits it requires approximately the same dose of neoarsphenamine to protect rabbits against the development of the disease when treated with one prophylactic dose two days after inoculation as is needed to cure rabbits of the infection when treatment is delayed until 2 months after inoculation or until late in the active stage of the rabbit infection.

The results obtained by the one dose prophylactic treatment, as reported by Greenbaum and Harkins (7) (1924) and by Wakerlin and Loevenhart (8) (1928), placed the effective dose of neoarsphenamine at 45 mg and 40 mg per kilo, respectively. This compares with the one dose sterilizing or curative efficiency of neoarsphenamine late in the active stage of the disease, as reported by Voegtlin and Dyer (3) (1927) at 40 mg and supports the observation that the spirocheticidal activities of neoarsphenamine as obtained by these methods are in approximate agreement.

In 1931 Kolmer and Rule (9) observed that arsphenamine and neoarsphenamine were probably less effective as an abortive agent in experimental syphilis in rabbits than as a curative agent after the infection had developed. It was their recommendation that, in the study of the therapeutic activity in chemotherapeutic investigations, the experimental infection be permitted to become established before administration of the drug.

In the three experiments reported by Kolmer and Rule the minimal effective dose to abort syphilis with arsphenamine and neoarsphenamine and the curative dose of neoarsphenamine were not obtained. Definite relationship, therefore, between the abortive and the curative efficiency of neoarsphenamine was apparently not established by the experiments offered in the study.

Wakerlin and Loevenhart (8) reported that a parallelism existed between the prophylactic and sterilizing powers of the organic arsenicals and mercurial compounds. In their report the minimal sterilizing or curative dose was not ascertained; but the sterilizing efficiency of neoarsphenamine was accomplished by three treatments at weekly intervals during the eighth, ninth, and tenth weeks of the infection with total dosage of 180 mg per kilo. These authors concluded that the determination of the prophylactic activity should

become a part of the accepted technique in the evaluation of the therapeutic efficiency of a drug in the treatment of experimental syphilis in rabbits.

In view of the importance of this observation to the accepted technique of the study of antisyphilitic drugs, further investigation is necessary. If the relation between the prophylactic and sterlizing dose of neoarsphenamine is confirmed, then the former method would offer a satisfactory procedure of ascertaining the spirocheticidal activity of neoarsphenamine.

CONCLUSION

Two brands of neoarsphenamine, previously reported as varying in their trypanocidal activity and having approximately the same spirocheticidal activity as determined by the therapeutic and the prophylactic dose treatments, are here reported to be also remarkably uniform in sterilizing or curing experimental syphilis in rabbits when treatment is delayed until late in the active stage of the disease.

REFERENCES

(1) Probey and McCoy: Pub Health Rep, 45: 30 (1930), p. 1716.
(2) Probey: Pub. Health Rep, 47: 8 (1932), p 429
(3) Voegtlin and Dyer: Pub. Health Rep, 42: 3 (1927), p. 176.
(4) Kolmer: Chemotherapy, 1926, p 323.
(5) Schamberg and Kolmer, with Madden: J A M A, 100: 3 (1933) p. 180.
(6) Wakerlin and Herrall: Arch Dermatol & Syphilol, 18 (1928), p. 539.
(7) Greenbaum and Harkins. Arch. Dermat & Syph, 10 (1924), p 409.
(8) Wakerlin and Loevenhart: Jour. Pharm. & Exp. Therap., 34 (1928), p. 15.
(9) Kolmer and Rule: J. Pharm. & Exp. Therap, 43 (1931) p. 521.

COURT DECISION RELATING TO PUBLIC HEALTH

Workmen's compensation act held not to take away right of action for noncompensable disease caused by employer's negligence.—(West Virginia Supreme Court of Appeals; *Jones v. Rinehart & Dennis Co., Inc., et al.*, 168 S.E. 482; decided Feb. 14, 1933.) An action for damages was brought by the administratrix of a deceased person who had been a laborer in the employ of the defendant company. The burden of the complaint was that, through the negligence of the defendants in causing and permitting large quantities of silica dust to pervade and saturate the atmosphere in a tunnel being constructed, the plaintiff's decedent contracted the disease known as silicosis and died therefrom.

One section of the workmen's compensation act provided as follows:

Any employer subject to this chapter, who shall elect to pay into the workmen's compensation fund the premiums provided by this chapter, shall not be

liable to respond in damages at common law or by statute for the injury or death of any employee, however occurring, after such election and during any period in which such employer shall not be in default in the payment of such premiums and shall have complied fully with all other provisions of this chapter *Provided*, That the injured employee has remained in his service with notice that his employer has elected to pay into the workmen's compensation fund the premiums provided by this chapter The continuation in the service of such employer with such notice shall be deemed a waiver by the employee and by the parents of any minor employee of the right of action, as aforesaid, which the employee or his or her parents would otherwise have

The proposition advanced by the defendants was that, under this provision of the act, subscribing employers, not in default, were relieved from liability to respond in damages for the injury or death of an employee, however occurring, regardless of whether there was involved a compensable or a noncompensable injury.

In approaching a decision on the matter, the supreme court of appeals said that it seemed clear that an employee had a right of action at common law for disease arising from his employment through the negligence of the employer, and that, if such right of action had not been taken away by the compensation act, the administratrix of the decedent in the instant case had the right to prosecute the action under the statute relating to death from a wrongful or negligent act.

After considering various portions of the compensation act, the court said that certain phrases, which were specified, and numerous other similar ones in the act indicated that the legislature in dealing with the subject "was in no wise considering diseases arising from occupation extending over an indefinite period of time", and that it was of the opinion "that disease, whether occupational or otherwise, is not compensable under the West Virginia statute, except in those instances where the disease is attributable to a specific and definite event which may reasonably be classed as a personal injury."

Recurring to the query as to whether the above-quoted statutory provision exempted an employer, who was protected by the compensation act, from liability for a wrong to an employee arising from a disease contracted in the course of his employment through the negligence of his employer, even though the disease was not compensable under the compensation statute, the court said that it was "difficult to perceive a satisfactory and reasonable basis for exemption of employers from liability for disease caused by their negligence, such disease being noncompensable under the compensation statute", and declared that "we are of opinion that it was the legislative intent, as expressed in our compensation law (Code 1931, 23-2-6, Code 1932, sec. 2516), to exempt employers from liability for damages at common law or by statute for compensable injury or death of employees, however occurring, but not to exempt from liability for noncompensable

disease (caused by negligence of the employer) or death resulting from such disease." In reaching this view of the matter, the court stated, in part, as follows:

* * * Recognizably, the statutory provision under immediate consideration, namely, that employers under the protection of the Workmen's Compensation Act "shall not be liable to respond in damages at common law or by statute for the injury or death of any employee, however occurring", is susceptible of two constructions—the one would measure the words as they stand alone; the other would appraise them in the light of other phraseology of the same section and of other provisions of the act and of the various complexities of the situation as herein undertaken to be discussed. We do not share the view that this is essentially a legislative matter and that the above-quoted words of the statute must be literally construed and the effect given to them which the phrase imports when standing alone. True, the courts must administer the law as it is written and must not undertake to make law. But where a court is confronted with two constructions—the first destructive of personal rights in that it takes away the means of effectuating such rights and of obtaining redress for their breach, and the other not destructive of either rights or remedies but harmonizing with basic conceptions of personal justice—the latter is preferred. This is interpreting law, not making it. The courts will not recognize that there is an open gap in the law where by reasonable interpretation such undesired condition can be avoided. * * *

DEATHS DURING WEEK ENDED JUNE 10, 1933

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended June 10, 1933	Corresponding week, 1932
Data from 85 large cities of the United States:		
Total deaths	7,930	7,528
Deaths per 1,000 population, annual basis	11.1	10.7
Deaths under 1 year of age	591	617
Deaths under 1 year of age per 1,000 estimated live births [1]	40	50
Deaths per 1,000 population, annual basis, first 23 weeks of year	11.7	12.2
Data from industrial insurance companies:		
Policies in force	67,832,442	72,767,250
Number of death claims	12,540	13,678
Death claims per 1,000 policies in force, annual rate	9.6	9.8
Death claims per 1,000 policies, first 23 weeks of year, annual rate	10.5	10.8

[1] 81 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended June 17, 1933, and June 18, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 17, 1933, and June 18, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended June 17, 1933	Week ended June 18, 1932	Week ended June 17, 1933	Week ended June 18, 1932	Week ended June 17, 1933	Week ended June 18, 1932	Week ended June 17, 1933	Week ended June 18, 1932
New England States:								
Maine	1	3		8	1	114	0	0
New Hampshire		1			55	79	0	0
Vermont	1	5			56	203	0	0
Massachusetts	16	22		1	608	732	1	3
Rhode Island	2	6				12	0	0
Connecticut	4		3		123	193	0	2
Middle Atlantic States:								
New York	60	96	[1] 5	[1] 9	1,508	1,801	3	9
New Jersey	24	28	2	9	777	605	1	3
Pennsylvania	47	70			1,005	983	4	6
East North Central States:								
Ohio	28	13	76	5	71	1,027	1	1
Indiana	8	17	14	6	125	91	1	5
Illinois	24	48	13	12	442	602	3	7
Michigan	51	15	3	7	630	2,445	1	0
Wisconsin	5	12	10	4	220	934	1	0
West North Central States:								
Minnesota	9	7	1	3	157	68	1	0
Iowa	3	12			45	6	0	0
Missouri	22	32			141	50	1	1
North Dakota		1			131	64	2	0
South Dakota		2			4	7	0	0
Nebraska	4	3			58	2	0	0
Kansas	5	6		2	106	169	1	2
South Atlantic States:								
Delaware					17		0	0
Maryland [2 3 4]	11	8	3	4	32	78	0	0
District of Columbia [2]	1	5			21	24	0	0
Virginia	9				150		0	
West Virginia		10		16	54	202	2	0
North Carolina	9	5	4	1	392	545	1	0
South Carolina [4]	3	6		194	194	115	0	0
Georgia [4]	6	5		41	94	61	0	0
Florida [4]	3	19	1	6	9	21	0	0
East South Central States:								
Kentucky	6	7	9		31	13	0	1
Tennessee	5	7	5	22	208	4	0	2
Alabama [4]	12	13	3	9	26	5	1	0
Mississippi	3	4					0	1

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 17, 1933 and June 18, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended June 17, 1933	Week ended June 18, 1932	Week ended June 17, 1933	Week ended June 18, 1932	Week ended June 17, 1933	Week ended June 18, 1932	Week ended June 17, 1933	Week ended June 18, 1932
West South Central States:								
Arkansas	4	1		19	130	1	1	0
Louisiana	7	18	12	1	18	6	1	0
Oklahoma [5]	4	7	15	9	128	117	0	0
Texas [4]	37	17	77	10	753	41	1	0
Mountain States:								
Montana [2]			1	4	20	166	1	0
Idaho [2]				1	9	1	0	0
Wyoming [2]					4	30	0	0
Colorado [2]	2	3			6	61	0	1
New Mexico	8	5			19	18	1	0
Arizona				4		5	0	0
Utah [3]					59		0	0
Pacific States:								
Washington	4	8			83	101	0	0
Oregon [2]	3	10	12	19	44	157	0	0
California	28	48	20	42	771	424	3	0
Total	479	605	289	468	9,535	12,473	33	44

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended June 17, 1933	Week ended June 18, 1932	Week ended June 17, 1933	Week ended June 18, 1932	Week ended June 17, 1933	Week ended June 18, 1932	Week ended June 17, 1933	Week ended June 18, 1932
New England States:								
Maine	1	0	12	32	0	0	4	1
New Hampshire	0	0	13	19	0	0	0	0
Vermont	0	0	7	15	0	6	0	0
Massachusetts	0	0	215	305	0	0	2	3
Rhode Island	0	0	20	40	0	0	1	0
Connecticut	1	3	39	73	0	0	0	1
Middle Atlantic States:								
New York	2	3	449	706	0	0	20	15
New Jersey	0	2	100	217	0	0	5	8
Pennsylvania	0	0	341	502	0	0	11	21
East North Central States:								
Ohio	0	4	406	120	6	22	20	10
Indiana	0	0	46	32	4	14	10	7
Illinois	1	3	208	280	5	9	12	21
Michigan	1	0	254	389	0	3	4	1
Wisconsin	0	2	92	57	8	1	0	1
West North Central States:								
Minnesota	0	0	50	55	1	4	1	2
Iowa	0	0	17	13	10	20	2	0
Missouri	0	0	28	17	0	2	6	5
North Dakota	0	1	0	5	1	1	1	4
South Dakota	0	0	6	7	0	1	4	2
Nebraska	0	0	4	4	8	6	0	0
Kansas	0	0	11	13	1	14	5	4
South Atlantic States:								
Delaware	0	0	3	8	0	0	0	0
Maryland [2 3 4]	0	0	42	45	0	0	2	7
District of Columbia [2]	0	0	4	10	0	0	0	0
Virginia	0	1	23		0		21	
West Virginia	0	0	18	14	0	1	5	25
North Carolina	0	1	27	19	0	1	27	37
South Carolina [4]	0	0	1	1	0	1	30	41
Georgia [4]	0	0	3	4	0	0	37	25
Florida [4]	0	0	1	3	0	0	5	1
East South Central States:								
Kentucky	0	0	19	32	0	6	20	22
Tennessee	0	0	4	12	0	1	27	54
Alabama [4]	1	0	10	8	3	3	18	13
Mississippi	0	3	3	2	0	8	8	31

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 17, 1933, and June 18, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended June 17, 1933	Week ended June 18, 1932	Week ended June 17, 1933	Week ended June 18, 1932	Week ended June 17, 1933	Week ended June 18, 1932	Week ended June 17, 1933	Week ended June 18, 1932
West South Central States:								
Arkansas	0	0	1	1	0	3	17	12
Louisiana	1	1	4	2	0	0	19	24
Oklahoma [5]	0	0	6	14	7	10	19	13
Texas [4]	1	1	13	13	20	17	52	10
Mountain States:								
Montana [2]	0	0	1	10	0	15	3	0
Idaho [2]	0	0	0	0	2	0	1	2
Wyoming [2]	0	0	4	3	0	0	1	1
Colorado [2]	0	0	14	24	1	0	0	1
New Mexico	0	0	0	1	0	0	0	4
Arizona	1	0	8	2	0	0	1	2
Utah [3]	0	1	4	0	0	0	0	0
Pacific States:								
Washington	0	2	26	17	6	16	1	3
Oregon [2]	0	0	15	3	20	8	2	6
California	1	2	132	126	18	5	9	16
Total	11	30	2,705	3,290	121	198	433	450

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended June 17, 1933, 29 cases: 4 cases in Maryland, 2 cases in District of Columbia, 9 cases in Montana, 3 cases in Idaho, 5 cases in Wyoming, 1 case in Colorado, and 5 cases in Oregon.
[3] Week ended Friday.
[4] Typhus fever, week ended June 17, 1933, 50 cases: 1 case in Maryland, 5 cases in South Carolina, 13 cases in Georgia, 3 cases in Florida, 24 cases in Alabama, and 13 cases in Texas.
[5] Figures for 1933 are exclusive of Oklahoma City and Tulsa and for 1932 are exclusive of Tulsa only.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week:

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
April 1933										
Colorado	3	14			38		1	130	17	2
May 1933										
Arizona	7	8	4	1	468	1	0	43	2	2
Colorado		11			60		0	144	8	2
Florida	1	26	12	11	202	11	2	10	0	8
Iowa	4	29	2		319		0	104	104	6
New Jersey	6	100	13	1	5,780		8	1,022	0	25
Ohio	1	93	220	1	2,305		5	3,098	20	40
South Carolina		118	704	724	1,412	300	0	9	4	51
South Dakota		6	2		98		1	32	0	5
Wisconsin	5	12	99		1,470		3	513	21	10
Wyoming		1			65		1	39	2	

April 1933

	Cases
Colorado:	
Chicken pox	277
Impetigo contagiosa	17
Mumps	369
Paratyphoid fever	1
Rocky Mountain spotted fever	1
Septic sore throat	1
Vincent's angina	2
Whooping cough	41

May 1933

	Cases
Anthrax:	
New Jersey	1
Chicken pox:	
Arizona	52
Colorado	401
Florida	79
Iowa	185
New Jersey	1,717
Ohio	1,920
South Carolina	109
South Dakota	132
Wisconsin	2,419
Wyoming	52
Conjunctivitis:	
Iowa	1
Diarrhea:	
South Carolina	1,063
Dysentery:	
Arizona	2
Florida	3
Food poisoning:	
Ohio	35
German measles:	
Arizona	10
Iowa	16
New Jersey	88
Ohio	349
Hookworm disease:	
South Carolina	101
Impetigo contagiosa:	
Colorado	31
Iowa	2

May 1933—Continued

	Cases
Lead poisoning:	
Ohio	6
Lethargic encephalitis:	
Florida	1
New Jersey	2
Ohio	5
South Carolina	3
Wisconsin	1
Mumps:	
Arizona	79
Colorado	237
Florida	54
Iowa	411
New Jersey	1,297
Ohio	278
South Carolina	74
South Dakota	19
Wisconsin	499
Wyoming	3
Ophthalmia neonatorum:	
New Jersey	1
Ohio	79
South Carolina	12
Paratyphoid fever:	
Florida	2
South Carolina	7
Psittacosis:	
South Dakota	1
Puerperal septicemia:	
Ohio	2
South Dakota	1
Rabies in animals:	
New Jersey	26
Rocky Mountain spotted fever:	
Colorado	7
Wyoming	31
Septic sore throat:	
Colorado	6
Ohio	321
South Dakota	1
Wyoming	1

May 1933—Continued

	Cases
Tetanus:	
Colorado	1
New Jersey	2
Ohio	2
Trachoma:	
Arizona	20
New Jersey	5
Ohio	2
Trichinosis:	
Iowa	1
New Jersey	1
South Dakota	1
Tularaemia:	
South Carolina	1
Wisconsin	1
Wyoming	10
Typhus fever:	
Florida	2
South Carolina	2
Undulant fever:	
Arizona	4
Colorado	1
Florida	1
Iowa	18
New Jersey	2
Ohio	9
Wisconsin	5
Vincent's angina:	
Colorado	5
Iowa	3
Whooping cough:	
Arizona	96
Colorado	52
Florida	83
Iowa	70
New Jersey	715
Ohio	597
South Carolina	448
South Dakota	10
Wisconsin	824
Wyoming	31

WEEKLY REPORTS FROM CITIES

City reports for week ended June 10, 1933

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	0		1	2	0	5		0	0	0	17
New Hampshire:											
Concord	0		0	0	0	0	0	1	0	0	7
Manchester	0		0	0	0	2	0	0	0	0	12
Nashua	0		0	1	0	1	0	0	0	0	
Vermont:											
Barre	0		0	0	0	0	0	1	0	3	2
Burlington	0		0	0	0	0	0	0	0	0	3
Massachusetts:											
Boston	6		0	261	9	69	0	9	1	46	204
Fall River	0		0	0	0	3	0	2	0	5	22
Springfield	0		0	1	0	7	0	0	1	8	28
Worcester	0		0	57	2	0	0	0	0	5	24
Rhode Island:											
Pawtucket	0		0	1	0	0	0	0	0	0	13
Providence	4		0	2	4	16	0	2	0	13	47
Connecticut:											
Bridgeport	0		1	16	0	15	0	1	0	0	31
Hartford	0		0	2	2	12	0	0	0	1	25
New Haven	0		1	6	0	1	0	0	0	24	45
New York:											
Buffalo	2		2	74	13	32	0	8	0	24	156
New York	36	4	8	828	117	131	0	98	12	157	1,450
Rochester	0		0	2	3	23	0	1	1	8	80
Syracuse	0		0	0	2	8	0	2	0	15	42
New Jersey:											
Camden	1		0	12	0	5	0	2	0	0	29
Newark	0		0	85	12	4	0	6	0	45	110
Trenton	0		1	31	2	5	0	3	0	4	37

City reports for week ended June 10, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Pennsylvania:											
Philadelphia	4	-------	1	475	22	66	0	38	2	20	421
Pittsburgh	4	1	0	8	11	61	0	11	0	67	149
Reading	2	-------	0	16	2	3	0	1	1	4	27
Scranton	0	-------	-------	1	-------	2	0	-------	1	3	-------
Ohio:											
Cincinnati	1	-------	2	17	3	26	0	2	0	3	132
Cleveland	5	37	0	4	14	115	0	6	3	39	203
Columbus	0	-------	0	6	3	32	0	4	0	0	75
Toledo	1	-------	0	108	1	94	0	6	0	3	68
Indiana:											
Fort Wayne	4	-------	0	0	2	8	0	1	0	0	28
Indianapolis	0	-------	1	84	12	7	0	3	0	14	-------
South Bend	0	-------	0	2	1	1	0	0	0	0	18
Terre Haute	0	-------	0	16	2	4	0	0	0	2	22
Illinois:											
Chicago	8	5	2	293	35	214	0	57	0	28	763
Cicero	2	-------	0	8	0	5	0	0	0	0	4
Springfield	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Michigan:											
Detroit	18	1	0	243	7	55	0	15	2	116	230
Flint	0	2	0	2	5	2	0	0	0	0	28
Grand Rapids	0	-------	0	1	2	4	0	1	0	11	34
Wisconsin:											
Kenosha	0	-------	0	2	0	0	0	0	0	11	2
Madison	0	-------	-------	28	-------	2	0	-------	0	6	-------
Milwaukee	0	-------	0	2	1	36	0	9	0	78	103
Racine	1	-------	0	0	0	12	0	0	0	14	12
Superior	0	-------	0	1	0	0	0	1	0	9	9
Minnesota:											
Duluth	0	-------	0	18	0	0	0	2	0	50	18
Minneapolis	2	-------	0	16	2	24	0	1	0	31	98
St. Paul	0	-------	0	60	5	5	0	4	0	72	64
Iowa:											
Des Moines	2	-------	-------	2	-------	5	0	-------	0	0	30
Sioux City	0	-------	-------	1	-------	4	0	-------	0	2	-------
Waterloo	0	-------	-------	0	-------	0	1	0	0	1	-------
Missouri:											
Kansas City	1	-------	0	18	3	19	0	6	0	1	96
St. Joseph	3	-------	0	6	1	0	0	1	2	1	10
St. Louis	11	-------	0	136	6	10	0	7	1	11	221
North Dakota:											
Fargo	0	-------	0	0	0	0	0	0	0	0	-------
Grand Forks	0	-------	0	0	0	0	0	0	0	1	-------
South Dakota:											
Aberdeen	0	-------	0	0	0	0	0	0	0	0	-------
Sioux Falls	0	-------	0	0	0	1	0	0	0	0	9
Nebraska:											
Omaha	3	-------	0	113	4	3	1	1	1	16	48
Kansas:											
Topeka	0	-------	0	27	0	1	0	1	0	0	10
Wichita	0	-------	0	0	2	0	0	0	0	7	36
Delaware:											
Wilmington	0	-------	0	7	1	1	0	0	0	6	26
Maryland:											
Baltimore	2	-------	1	4	12	36	0	8	2	70	197
Cumberland	0	-------	0	4	0	0	0	0	0	0	8
Frederick	0	-------	0	0	0	0	0	0	0	0	3
District of Columbia:											
Washington	0	1	1	22	8	8	0	19	1	8	150
Virginia:											
Lynchburg	2	-------	0	28	1	2	0	0	0	18	11
Norfolk	0	-------	0	42	0	0	0	3	0	0	34
Richmond	1	-------	0	0	4	5	0	7	1	13	51
Roanoke	1	-------	0	2	1	1	0	1	0	0	20
West Virginia:											
Charleston	0	-------	0	0	1	0	0	0	0	2	10
Huntington	0	-------	0	0	0	0	0	0	0	0	-------
Wheeling	0	-------	0	6	0	3	0	1	0	7	23
North Carolina:											
Raleigh	0	-------	0	0	2	0	0	0	0	0	19
Wilmington	0	-------	0	11	0	0	0	1	0	0	6
Winston-Salem	1	-------	0	3	1	10	0	4	0	3	17

City reports for week ended June 10, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
South Carolina:											
Charleston	0	7	0	0	2	1	0	1	0	1	23
Columbia	0	------	0	0	1	0	0	0	0	0	22
Georgia:											
Atlanta	0	4	0	19	2	1	0	3	4	18	88
Brunswick	0	------	0	0	0	0	0	0	0	0	3
Savannah	0	2	0	0	1	0	0	3	2	0	28
Florida:											
Miami	0	1	0	0	0	0	0	2	0	25	24
Tampa	2	------	0	0	0	1	0	0	0	1	30
Kentucky:											
Ashland	0	------	0	0	0	2	0	0	0	0	------
Lexington	0	------	0	2	0	0	0	2	0	0	10
Louisville	0	1	0	7	5	13	0	2	4	4	76
Tennessee:											
Memphis	1	------	1	71	12	0	0	5	1	27	85
Nashville	0	------	0	4	2	0	0	2	1	2	47
Alabama:											
Birmingham	0	------	0	1	4	3	0	3	1	2	52
Mobile	0	------	0	0	0	2	0	3	0	0	21
Montgomery	4	------	------	0	------	1	0	------	2	0	------
Arkansas:											
Fort Smith	0	------	------	0	------	0	0	------	0	1	------
Little Rock	0	------	0	46	1	8	0	1	0	0	4
Louisiana:											
New Orleans	4	3	0	8	6	4	0	15	1	5	154
Shreveport	0	------	0	1	2	1	0	3	0	0	32
Oklahoma:											
Oklahoma City	0	20	0	40	5	0	0	2	0	0	41
Tulsa	0	------	0	84	0	3	0	0	1	14	------
Texas:											
Dallas	2	------	0	20	3	0	1	1	1	0	52
Fort Worth	1	------	0	0	1	0	0	3	0	0	31
Galveston	0	------	0	0	3	0	0	3	0	0	19
Houston	2	------	0	1	2	0	0	6	4	1	66
San Antonio	1	------	2	5	1	0	0	7	0	1	72
Montana:											
Billings	0	------	0	0	0	0	0	0	0	0	3
Great Falls	0	------	0	0	1	0	0	0	0	6	6
Helena	0	------	0	0	0	0	0	0	0	0	3
Missoula	0	------	0	1	0	1	0	0	0	0	5
Idaho:											
Boise	0	------	0	0	0	0	1	1	0	2	5
Colorado:											
Denver	2	21	0	1	5	8	0	5	0	8	78
Pueblo	0	------	0	0	1	0	0	0	0	2	12
New Mexico:											
Albuquerque	1	------	0	0	1	0	0	4	0	6	7
Utah:											
Salt Lake City	1	------	0	84	3	4	0	0	0	32	42
Nevada:											
Reno	0	------	0	0	1	0	0	0	0	0	3
Washington:											
Seattle	0	------	------	1	------	4	0	------	0	13	------
Spokane	0	------	------	6	------	6	0	------	0	0	------
Tacoma	0	------	0	1	0	0	0	0	0	0	13
Oregon:											
Portland	0	------	0	10	3	12	3	2	0	0	53
Salem	0	------	------	2	------	0	0	------	0	0	------
California:											
Los Angeles	12	12	1	359	5	48	10	20	1	66	251
Sacramento	0	------	0	1	1	8	0	2	0	46	26
San Francisco	1	------	0	2	2	8	0	11	0	40	147

City reports for week ended June 10, 1933—Continued

State and city	Meningococcus meningitis		Polio-myelitis cases	State and city	Meningococcus meningitis		Polio-myelitis cases
	Cases	Deaths			Cases	Deaths	
New York: New York	3	2	0	Missouri: Kansas City	1	0	0
Pennsylvania: Philadelphia	2	1	0	District of Columbia: Washington	1	1	0
Pittsburgh	1	0	0	Georgia: Atlanta	0	1	0
Ohio: Toledo	1	1	0	Washington: Seattle	0	0	1
Indiana: Indianapolis	2	0	0	California: Los Angeles	1	0	1
Illinois: Chicago	7	6	0	San Francisco	1	0	0
Michigan: Detroit	0	0	1				
Wisconsin: Milwaukee	2	1	0				

Lethargic encephalitis.—Cases: Boston, 2; New York, 2; Chicago, 1; Detroit, 1; Grand Rapids, 1; Milwaukee, 1; St. Paul, 2; Birmingham, 1.

Pellagra.—Cases: Washington, 1; Charleston, S.C., 1; Atlanta, 1; Savannah, 2; Miami, 2; Birmingham, 1; New Orleans, 1; Oklahoma City, 1; Dallas, 1; Albuquerque, 1.

Rabies (in man).—Memphis, 1 case and 1 death.

Typhus fever.—Cases: Savannah, 1; Tampa, 2; New Orleans, 1.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Two weeks ended June 3, 1933.—The Department of Pensions and National Health of Canada reports cases of certain communicable diseases for the 2 weeks ended June 3, 1933, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		1			2	1	1			5
Chicken pox		2		293	406	74	69	42	110	1,086
Diphtheria			1	28	22	18	6		2	77
Erysipelas				12	4	4	2	2		24
Influenza				1	1		160		3	165
Lethargic encephalitis					1				1	2
Measles			18	645	215	5	5		41	929
Mumps					229	41	5		41	316
Paratyphoid fever		1			4					5
Pneumonia (all forms)		4			9		16		6	35
Poliomyelitis					3	1				4
Scarlet fever		9	33	80	151	22	27	6	25	353
Smallpox					1		1			2
Trachoma							34			34
Tuberculosis	6		48	127	123	16	13	4	30	367
Typhoid fever			8	25	13	6	2	1	4	51
Undulant fever					6					6
Whooping cough				133	155	96	11	9	55	459

Ontario Province—Communicable diseases—Four weeks ended May 27, 1933.—The Department of Health of Ontario Province, Canada, reports certain communicable diseases for the 4 weeks ended May 27, 1933, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	3	4	Poliomyelitis	1	
Chicken pox	857		Scarlet fever	265	1
Diphtheria	29		Septic sore throat	2	
Erysipelas	19		Smallpox	3	
German measles	45		Syphilis	91	
Gonorrhea	107		Tetanus		1
Influenza	16	3	Tuberculosis	174	41
Lethargic encephalitis	1		Tularaemia	1	
Measles	564		Typhoid fever	19	1
Mumps	729		Undulant fever	8	
Paratyphoid fever	11		Whooping cough	365	1
Pneumonia		121			

LATVIA

Communicable diseases—February–April 1933.—During the months of February, March, and April 1933, certain communicable diseases were reported in Latvia as follows:

Disease	Cases			Disease	Cases		
	February	March	April		February	March	April
Cerebrospinal meningitis	4	5	5	Poliomyelitis	2	2	
Diphtheria	92	76	56	Puerperal septicemia	8	2	2
Erysipelas	19	31	27	Scarlet fever	40	59	68
Influenza	1155	1893	840	Tetanus			3
Leprosy		1	1	Trachoma	82	84	59
Lethargic encephalitis			1	Typhoid fever	79	30	42
Measles	695	858	823	Typhus fever		2	
Mumps	159	176	136	Whooping cough	152	150	96
Paratyphoid fever	4	6	7				

PUERTO RICO

Communicable diseases—Four weeks ended April 22, 1933.—During the 4 weeks ended April 22, 1933, cases of certain communicable diseases were reported in Puerto Rico, as follows:

Disease	Cases	Disease	Cases
Chicken pox	137	Ophthalmia neonatorum	6
Colibacillosis	2	Pellagra	7
Diphtheria	50	Puerperal fever	5
Dysentery	359	Syphilis	21
Erysipelas	1	Tetanus	5
Filariasis	5	Tetanus, infantile	5
Framboesia, tropical	1	Trachoma	7
Influenza	108	Tuberculosis	381
Malaria	1,619	Typhoid fever	17
Measles	157	Whooping cough	148
Mumps	19		

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

CHOLERA

[C indicates cases; D, deaths; P, present]

Place		Nov. 13–Dec. 10, 1932	Dec. 11, 1932–Jan. 7, 1933	Jan. 8–Feb. 4, 1933	Feb. 5–Mar. 4, 1933	Week ended— March 1933 11	March 1933 18	March 1933 25	April 1933 1	April 1933 8	April 1933 15	April 1933 22	April 1933 29	May 1933 6	May 1933 13	May 1933 20	May 1933 27	June 1933 3	June 1933 10	June 1933 17
China:																				
Amoy	C		6																	
Canton	C	1																		
Macao	C							1												
	D							1												
Swatow	C															2				
India	C	3,453	4,524	3,396	3,171	1,052	1,695	2,115	3,016	2,583	2,642									
	D	1,907	2,400	1,721	5,170	530	856	1,043	1,423	1,311	1,277									
Bombay	C			1	1						1					1	1			
Calcutta	C	53	54	110	114	50	53	93	131	136	184	188	264	186	192	158	124			
Chittagong	C				1			1	4	3	8	5		10	8	2	1			
Colong	C												1							
Rangoon	C										1					1				
India, French: Chandernagor	C			1	2															
Indo-China (see also table below):																				
Pnom-Penh	C		1						1							1	1	1		
Saigon and Cholon	C			2					1		1	2	1							
Philippine Islands:																				
Bohol Province	C																15	40	14	13
	D																12	20	9	7
Cebu Province	C				17	2												1		
Iloilo Province—Iloilo	C													1						
	D													1						
Leyte Province	C	7	80	110	78	23		1	2		9	3	38	9		9	1			
	D	7	44	76	56	21		1	2		7	4	35	8		8	1		2	
Rizal Province	C													1						
Samar Province	C	35	135	121				[1] 186			67					29				3
	D	26	101	75				[1] 144			50					23				3
Siam	C		1	2								1		1						
On vessel: S.S. Dunana at Madras	D																1			

[1] For month of March 1933.

Place		November 1932	December 1932	January 1933: 1–10	January 1933: 11–20	January 1933: 21–31	February 1933: 1–10	February 1933: 11–20	February 1933: 21–28	March 1933: 1–10	March 1933: 11–20	March 1933: 21–31	April 1933: 1–10	April 1933: 11–20	April 1933: 21–30
Indo-China (French) (see also table above):															
Cambodia [2]	C	1	5				9		1		2	2	5		4
	D	1	2				6				1	2	5		2
Cochin-China [2]	C	1	8	1	4	2	9	2	1	8	4	2	2	7	
	D	1	6	1	1		6	2	1	7	3	2	2	7	

[2] Reports incomplete.

PLAGUE [1]

[C indicates cases; D, deaths; P, present]

Place		Nov. 13–Dec. 10, 1932	Dec. 11, 1932–Jan. 7, 1933	Jan. 8–Feb. 4, 1933	Feb. 5–Mar. 4, 1933	Week ended— March 1933: 11	March 1933: 18	March 1933: 25	April 1933: 1	April 1933: 8	April 1933: 15	April 1933: 22	April 1933: 29	May 1933: 6	May 1933: 13	May 1933: 20	May 1933: 27
Angola	C	P			P												
Argentina:																	
Cordoba Province	C		2	1	5			5				1					8
Jujuy Province	C			10	6												
Rosario	C							2									
Salta Province	C	12															
San Luis Province [2]	C	P											7				
Santa Fe	C		1														
Belgian Congo	C		1										P				
Bolivia: Tomina Province	C				P								P				
British East Africa (see also table below):																	
Tanganyika	D	1		2		1											1
Uganda	C	194	141	58	40	9	10	9	16	12	8						
	D	169	134	58	40	9	10	9	16	12	8						
Ceylon:																	
Central Province	C			9			4	2									
	D			7			4	2									
Colombo	C	11	4	5	10	11		1	1		1						
	D	7	3	3	7	9		1	1								
Plague-infected rats			4		4												

[1] Including plague in the United States and its possessions.
[2] Several cases of plague with 1 death were reported at Quines, San Luis Province, Argentina, on Dec. 9, 1932.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE

[C indicates cases; D, deaths; P, present]

Place		Nov. 13–Dec. 10, 1932	Dec. 11, 1932–Jan. 7, 1933	Jan. 8–Feb. 4, 1933	Feb. 5–Mar. 4, 1933	Week ended— March 1933 11	March 18	March 25	April 1933 1	April 8	April 15	April 22	April 29	May 1933 6	May 13	May 20	May 27
Dutch East Indies:																	
Batavia	C						[3] 1										
West Java	C	610	1,152	1,329	1,152					271			228				
	D	608	745							271			227				
Ecuador. (See table below.)																	
Egypt:																	
Alexandria	C		2	1		1						1					
Assiout	C		6	4	4	4	2		2	4	4	2	2	1	4	3	2
Minieh	C						1	1				1					
France: Marseille	C		1														
Hawaii Territory:																	
Hawaii Island:																	
Hamakua—Kukaiau	C			1													
	D			1													
Plague-infected rats			2	7													
Paauilo—Plague-infected rats		1	11	1													
Maui Island—Makawao:																	
Plague-infected rats				1													
Omaopio—Plague-infected rats				1													
India	C	6,104	6,900	6,662	6,399	1,587	1,390	1,108	1,324	801							
	D	3,060	4,349	4,191	3,775	970	887	657	954	513							
Bassein	C			1	2	1	4	3	4	4		6	3	2	1		
Plague-infected rats		1	1	1	2				1		1				1	1	1
Bombay	C				3	2	1	6	6	2	2	3	3	2	2	2	
Plague-infected rats		15	16	23	68	26	26	25	44	22	23	28	30	6	13	7	8
Madras Presidency	C	546	446	508	378	57	69				5	10					
	D	197	249	170	173	27	30				2	1					
Rangoon	C	3	1	1	2	2									1		
Plague-infected rats				1	2	1											
Indo-China. (See table below.)																	
Iraq: Baghdad	C	1			3		1								2		1
Madagascar. (See table below.)																	
Morocco	C	10	16		4	14	8	9	2		12	8	8	2			
Peru. (See table below.)																	
Senegal. (See table below.)																	
Siam	C	9	12	7	16	10	1			1	1						

South-West Africa.[4]																	
Straits Settlements: Singapore	C											1	1				
Syria: Beirut	C	12										1					
Union of South Africa: Orange Free State	C	P	P	4	1									1			
United States: California—San Benito Bounty—Plague-infected ground squirrels				1													
On vessel: S.S. Kingsborough at port in Argentina	C							1									

[3] Imported.
[4] 227 cases of plague with 53 deaths were reported in Ovamboland, South-West Africa, up to Dec. 17, 1932. Antiplague measures have been taken

Place		December 1932	January 1933	February 1933	March 1933	April 1933	May 1933
British East Africa (see also table above): Kenya	C	8	6	11	6	6	1
Ecuador	C		1		3		35
Indo-China	C	3	4	4	4	7	8
	D	3	2	4	4	7	8
Madagascar:							
Province:							
Ambositra	C	149	158	161	155		
	D	125	146	149	154		
Antisirabe	C	57	63	72	63		
	D	56	61	72	62		
Fianarantsoa	C			45	64		
	D			42	63		
Maevatanana	C	9	2	6	5		
Madagascar—Continued							
Province—Continued							
Miarinarivo	C	37	75	5	9		
	D	36	14	8	9		
Moramanga	C	186	163	23	4		
	D	183	159	23	[illegible]		
Tamatave	C	1			1		
	D	1			1		
Tananarive	C	186	[illegible]	209	175		
	D	179	190	207	[illegible]		
Peru	C	12	4	18	7	2	
Senegal:							
Dakar [5]	C	19	2	4	1	1	2
	D	17	2	4		1	1
Tivaouane [5]	C					1	

[5] Incomplete reports.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX

[C indicates cases; D, deaths; P, present]

Place		Nov. 13–Dec. 10, 1932	Dec. 11, 1932–Jan. 7, 1933	Jan. 8–Feb. 4, 1933	Feb. 5–Mar. 4, 1933	Week ended— March 1933 11	18	25	April 1933 1	8	15	22	29	May 1933 6	13	20	27	June 3, 1933
Arabia:																		
Aden	C	3	1	2	1													
Muscat—Oman Sultanate	C																	44
	D																	11
Algeria:																		
Algiers	C	1	1															
Constantine Department	C						1											
Argentina: Chaco Territory	C				P													
Bolivia	C		5		39			21										
Brazil:																		
Parahyba—Joao Pessoa	C	P																
Pernambuco—Recife	C	4																
Porto Alegre (alastrim)	C	8	16	1														
British East Africa:																		
Kenya	C				14	1	18	4			5							
Tanganyika	C	66	49	95	56	25	18		4	5			8					
British South Africa:																		
Northern Rhodesia	C		6		1		13	8										
Southern Rhodesia	C	1	1	25	22						8							
Canada:																		
Alberta	C	1																
British Columbia	C									[1] 6						[1] 1		[1] 1
Manitoba	C		13															
Ontario	C	3	5			3		2										
Toronto	C	3	3							[1] 3								
Saskatchewan	C	3	1	5	31	4		10		[1] 2						[1] 5		[1] 1
Ceylon:																		
Colombo	C	28	72	75	34	1	1	1	1	1	1							
Galle	C											39	7	2				
China:																		
Amoy	C			1	5	1		1	1	1		1	1					
Canton	C	180	762	504	234	26	17	10	14	13	10	11	6	3	3	1		
	D	14	23	13	1							1	1					
Chemulpo	C				17													
Dairen	C	2	1	4	5		2	2	1	1								

Foochow	C	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Hong Kong	C	2	18	78	169	53	43	37	36	36	14	20	14	6	8	3	2	
Macao	C		P	3	8	2	2	2	5	3	1			4				
Nanking	C	6	11	38	89	10	1		5		1		1		1			
Shanghai	C	13	23	41	28	16	7	8	7	9	8	15	7	4	12	8	9	3
Swatow	C	8	7	22	21	3	8	9	6	6	7	3		4	3	3		
Chosen. (See table below.)																		
Colombia: Cali	D	1																
Dahomey	C		5	22	32								26	2	9			
Dutch East Indies	C			1														
Egypt:																		
Alexandria	C	77	583	987	943	104	82	59	32	12	11	11	8	3	3		5	
	D	18	116	227	183	25	23	11	11	3	22	8	2	3	1		1	
Cairo	C	1	[illegible]	37	25	7		2		1	2	2	5	5	4	1	3	3
Gharbieh	C		37															
Port Said	C			2		1	2	3		3								
Suez	C			2	4	1	2											
Great Britain:																		
England and Wales	C	72	79	66	76	15	23	15	18	31	14	18	33	23	22	20	13	
London	C	68	73	59	66	13	21	11	17	24	9	13	29	20	18	27	14	
London and Great Towns	C	71	76	66	75	13	22	14	17	30	9	14	32	20	18	29	15	
Greece. (See table below.)																		
Honduras:																		
Puerto Castilla	C	1				2												
Tegucigalpa	D						8	6				1			7			3
Tela	C	1	2	4	6	1	2					1						
India	C	7,919	11,284	20,423	31,824	8,021	8,232	9,214	9,471	9,222	9,319							
	D	2,239	3,523	5,907	8,303	1,932	1,987	2,236	2,236	2,218	2,360							
Bassein	C				7	5	2	3	3	14	12	10	21	11	2	7	12	
	D				2	1	1	1	2	3	3	3	5	3	5	1	2	
Bombay	C	87	230	805	1,522	358	341	259	217	159	141	115	95	69	72	44	47	
	D	35	98	391	795	286	178	142	111	94	72	65	55	57	35	[illegible]	29	
Calcutta	C	103	301	961	1,637	299	392	460	369	295	245	213	168	118	82	[illegible]	61	
	D	47	213	672	1,147	183	281	314	270	244	188	180	133	97	72	74	[illegible]	
Cochin	C					2	2			2	1	1	1					
Karachi	C	14	25	45	47	29	22	23	41	34	31	31	34	11	15	18	10	
Madras	C	119	156	351	564	153	143	195	175	135	125	115	115	66	67	[illegible]	[illegible]	
Moulmein	C				1													
Negapatam	C	4	2	3	2		2		2	1		2	3	4		1	2	
Rangoon	C	2	2	5	20	3	2	2	4	7	1	2	5	1	6	2	8	
Tuticorin	C	13								1								
Vizagapatam	C		1						5	1			3	1		1		
India (French): Pondichery Territory	C	3	2															
Indo-China (see also table below): Saigon and Cholon	C		2		3		4	2	1			2						
Iraq:																		
Baghdad	C	31	13	8	4	1			1			1	1	3		1	1	
Basra	C	81	25	6	3			1	1					5		1		
Ireland: Belfast	C				1													
	D				1													

[1] For 2 weeks.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths; P, present]

Place		Nov. 13–Dec. 10, 1932	Dec. 11, 1932–Jan. 7, 1933	Jan. 8–Feb. 4, 1933	Feb. 5–Mar. 4, 1933	Week ended—March 1933			Week ended—April 1933					Week ended—May 1933				Week ended—June 3, 1933
						11	18	25	1	8	15	22	29	6	13	20	27	
Japan:																		
Kobe	C					1	1	1	2									
Nagoya	C				1													
Osaka	C				3	1	1		1	3	4		1				1	
Tokyo	C						1	1		3		2	1		1			
Yokohama	C											1	2					
Mexico:																		
Coahuila	C				1												1	1
Juarez	C				3								5				2	
Mexico, D.F.	C	2		10	5			6		1		5	5		2			
Monterrey	D																2	
Saltillo	D	11	8	4	4	1		2			1			1	1			
San Luis Potosi	D		2									1						
Morocco. (See table below.)																		
Nigeria	C	1,581	553	401	1,878		444	118		853			408		5			
Persia	C	341	216	108	29	4	12	5	5	3	5	28	18	22	30	37		
	D	150	82	41	4	1	1	1	1	1	2	7	13	5	21	36		
Peru. (See table below.)																		
Poland	C		1											1		1		
Portugal:																		
Lisbon	C	9	12	4	4		1	1		1		1			1		1	
Oporto	C	14	9	5	5	1		1								1	1	
Siam: Bangkok	D			2	2		2	2										
Sierra Leone	C	13	10	217	36				63		14		8		18			
Sudan (Anglo-Egyptian)	C			57	34	19	6	3	4		12	1	5	3			2	1
Syria. (See table below.)																		
Turkey. (See table below.)																		
Union of South Africa:																		
Cape Province	C	P	P		P	P	P	P	P									
Orange Free State	C	P	P		P	P	P	P	P	P	P							
Transvaal	C	P	P	P														
Zanzibar	C				2													
On vessels:																		
S.S. Amassis at Alexandria	C			1														
S.S. British Engineer at Marseille	C	1																
S.S. Somersetshire at Suez	C	1		1														

S.S. Jervis Bay en route to Southampton	C	1																
	D	1																
S.S. Star of Alexandria at Alexandria	C		1															
S.S. Kohistan at Aden from Basra	C	1																
S.S. Volturno at Alexandria	C																	
S.S. Arimondi at Massaoua	C				1													
S.S. Hatasu at Malta	C				2													
S.S. Talma at Hong Kong	C					1												
S.S. Karapara at Rangoon	C				1													
S.S. Nawab at Rangoon	C				1													
S.S. California at Liverpool	C			1														
S.S. Kalgan at Bangkok from Swatow	C							1										
S.S. Nordland at Alexandria	C						1											
S.S. Hong Kheng at Rangoon	C								1									
S.S. Hiram at Bangkok	C				1													
S.S. Arunda at Rangoon from Calcutta	C						1											
S.S. Haiching at Amoy	C						1											
S.S. City of Nagpur at Karachi	C							1										
S.S. Rajputana at Aden	C										1							
S.S. Santhia at Singapore from Hong Kong	D															1		
	C															1		
S.S. Baron Inchcape	C												P		P			

Place		November 1932	December 1932	January 1933	February 1933			March 1933			April 1933			May 1933		
					1–10	11–20	21–25	1–10	11–20	21–31	1–10	11–20	21–30	1–10	11–20	21–31
Indo-China (see also table above)	C	180	213	253	29	98	60	167	83	120	107	159				
	D	51	45	58	16	33	28	55	30	45	31	30				
Syria: Beirut	C	41	49	34	11	8		2	11	7	3	35		7	9	4

Place		November 1932	December 1932	January 1933	February 1933	March 1933	April 1933
Chosen	C			7	17	30	4
Greece	D			1	5	7	2
	C				3	4	6

Place		November 1932	December 1932	January 1933	February 1933	March 1933	April 1933
Morocco	C	53	81	14	14		23
Peru	C	67		38		7	
Turkey	C			5		1	3

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER

[C indicates cases; D, deaths; P, present]

Place		Nov. 13–Dec. 10, 1932	Dec. 11, 1932–Jan. 7, 1933	Jan. 8–Feb. 4, 1933	Week ended— February 1933			March 1933				April 1933					May 1933				June 3, 1933
					11	18	25	4	11	18	25	1	8	15	22	29	6	13	20	27	
Algeria:																					
Algiers Department	C	2		1				1			1	2			1		7	2			
Constantine Department	C	3		6	8	3	34	26	21	32	38	16	3	36	95	55	72	41			
Bone	C		1		1						2				3		1	1			
Argentina: Buenos Aires	C			6																	
Bolivia. (See table below.)																					
British East Africa: Uganda	C	16	17	17	4	4	7	4	3	9											
Bulgaria	C	12	5	2			4	5	24	18	6			9							
Chile (see also table below)	C	166	223	152	47	34		52	23	30	26	25	54								
Antofagasta	C			1		1								1							
Santiago	C									1											
China: Hankow	C			3			5														
Colombia: Cali	D	1																			
Czechoslovakia. (See table below.)																					
Egypt:																					
Alexandria	C		1	1										11	6	6	6	7	4	7	5
Beheira	C	2		40							43										
Cairo	C										2	4	1	10	19	12	14	13	12	12	12
Gharbieh	C								70												
Port Said	C	1																			
Provinces	C		59	171				134		178											
Greece. (See table below.)																					
Guatemala. (See table below.)																					
Iraq: Baghdad	C											1			1			1		1	
Ireland: Belfast	C						1														
Irish Free State: Kerry County, Killarney district	C	16	5																		
Lithuania. (See table below.)																					
Mexico:																					
Mexico, D. F.	C	10	3	2	3	6	2		5	1	4	4			2	2	4	3			
San Luis Potosi	D										1										
Torreon	C	2																			
Morocco	C	22	43	63	4	4	66	64	11	26	9		3	6	6	2	6	10	8	7	
Palestine	C	2	1	1			1	1	1		2		1		1	1					
Persia	C	11	16	16	7	13	1	19	9	4	2	13	19	18	13	19	24	10	5		

Peru. (See t... ow.)																					
Poland	C	65	152	277	86	77	94	93	91	93	64	87	92	87	73	103	100	98	98	82	------
	D	6	8	26	6	4	5	5	8	6	2	4	8	6	9	1	3	5	4	6	------
Rumania	C	121	254	219	71	62	80	63	61	63	66	88	67	65	41	------	------	------	------	------	------
Tunisia: Tunis	C	1	9	35	1	20	8	5	2	10	24	9	4	17	26	------	9	3	20	9	7
Turkey (see also table below): Istanbul	C	------	3	5	------	------	1	------	3	------	1	------	------	1	------	------	------	------	------	------	------
Union of Socialist Soviet Republics (See table below)																					
Union of South Africa:																					
Cape Province	C	P	P	P	P	P	P	P	------	------	P	P	------	P	------	------	P	------	------	------	------
Natal	C	P	P	P	P	P	P	P	P	------	P	------	------	------	------	------	P	------	------	------	------
Orange Free State	C	P	P	P	P	P	P	P	P	------	P	P	------	P	------	------	P	------	------	------	------
Transvaal	C	P	P	P	------	------	------	------	P	------	------	------	------	------	------	------	------	------	------	------	------
Yugoslavia. (See table below.)																					
On vessel: S.S. Munplace at New Orleans from Progresso	C	------	------	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

Place		November 1932	December 1932	January 1933	February 1933	March 1933	April 1933	Place		November 1932	December 1932	January 1933	February 1933	March 1933	April 1933
Bolivia	C	------	4	29	33	72	50	Lithuania	C	1	10	36	13	12	19
Chile: Coquimbo Province	C	60	------	------	------	------	------	Peru	C	75	111	81	------	41	------
Czechoslovakia	C	------	------	------	13	9	------	Turkey	C	15	14	23	11	8	12
Greece	C	------	15	10	2	3	------	Yugoslavia	C	3	11	35	15	12	------
Guatemala	C	------	3	6	9	11	14								

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

YELLOW FEVER

[C indicates cases; D, deaths: P, present]

Place		Nov. 13–Dec. 10, 1932	Dec. 11, 1932–Jan. 7, 1933	Jan. 8–Feb. 4, 1933	Feb. 5–Mar. 4, 1933	Week ended— March 1933			April 1933					May 1933		
						11	18	25	1	8	15	22	29	6	13	20
Brazil:																
Ceara State	C	1														
Piauhy State	D		1													
French West Africa: Guinea	C	4		1												
	D	4		1												
Gold Coast	C				2									1		1
	D				2											
Guinea (Portuguese): Bissagos Islands	C			44												
	D			14												
Senegal:																
Bakel	C								1							
Dagana	C						1									
	D						1									
Podor	C							1								
Sudan (French): Keyes	C	2														
	D	2														